FLIGHT
and The AIRCRAFT ENGINEER

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The Outlook

This Strange War

MR. CHAMBERLAIN in his Sunday night broadcast must have gone far to enlighten those who are wondering why this War has taken its unexpected course. He reminded everyone that "the art of war consists in bringing the greatest possible force to bear at the right place and at the right time. In our case the place and time will be decided by those who are responsible for the strategy of the Allies." Naturally the Prime Minister did not reveal the inner thoughts of the responsible parties. Likewise, for those who wonder why there has been no massed air offensive on either side, he said not a word as to the strategy behind our own restraint, but as regards the German abstinence he remarked that they must have come to the conclusion that at present they would lose more than they would gain by such attacks. Later on he said "Even now we cannot assume that the Germans will not change their tactics and make a sudden attack from the air upon this country."

It may be felt that these words leave the matter very much where it was before, but in reality the remark about the Germans' obvious conclusion deserves a good deal of thought. There can be no such thing as a Maginot Line in the air, but the defences of Britain are as near as is possible to such a line. The German Command, perhaps in defiance of Hitler's wishes, have declined to assault the defence line on land, and Göring must know that attacks on civilian populations from the air will do nothing towards winning the war. Therefore why waste aircraft crews which may be badly needed for the land war on a futile object? The Germans have shown sound military sense in devoting all their air attacks, such as they were, to efforts to hamper our sea power. They may change their tactics, as Mr. Chamberlain said, but if they do it will be an evidence of despair.

Mines from Aircraft

THE magnetic mine is the latest weapon with which the Navy has to deal, and possibly it is the secret weapon to which Hitler alluded some time ago. For the most part these mines have been sown by submarines, but within the last few days it is announced that some mines, magnetic we have been told, have been dropped round our coasts by aircraft. Some, it is announced, were dropped by parachute from the aircraft, while in other cases it is supposed that a seaplane alighted and deposited the mines on the water at leisure.

The Prime Minister stated in his broadcast on Sunday evening that we know the secrets of the magnetic mine, and "we shall master it as we have mastered the U-boat." The mines dropped from aircraft are less of a menace than those laid by submarine. For one thing, even large bombers cannot carry anything like the number of mines which a submarine can convey. Then, the aircraft must be sure that it deposits its load in appropriate places. It would be no use to drop the mines in the open sea or on land. Therefore the operation can only be performed while there is a certain amount of daylight, and it is known that the unwelcome intruders came in at dusk. That imposes another limitation. The mine-laying machines cannot behave as the enemy reconnaissance machines have been behaving of late, namely arriving at a great height and hurrying away at the first hint of defence activity. The mine-layer must come in low, and so must run the risk of being caught by fighter patrols. Obviously if fighters catch sight of an enemy aircraft low down near our coasts, the chances of the latter making good its escape must be very small. The German crews who start off on such an enterprise will have to be very resolute men.

The idea of dropping mines from aircraft is not, of course, new. In *Flight* of April 7, 1938, was published an American suggestion for aerial mine-layers.

"Flight" photograph.

HITTING POWER: With their eight machine guns the Hawker Hurricanes have proved themselves formidable opponents.

Hitting Power

SO little has happened in this strange war—so far—that experience from which one might draw useful lessons is comparatively meagre. Last week our fighters in France had an opportunity to show the stuff they are made of. And the lesson to be learned, limited as the experience is, seems to be that the Air Council did wisely, many years ago, in adopting the recommendations of the Service chiefs to install multi-guns in our single-seater fighters.

From what can be gathered, the havoc wrought by the eight machine guns of the Hurricanes was considerable. The decision must have been one very difficult to make. Let it be remembered that the specification to which the Hurricane was built is a good many years old. At that time there was no way of finding out how air tactics were likely to develop. There were two ways open: To go "all out" for speed and performance generally, or to insist on very powerful armament, coupling with it the best speed possible.

The Hurricane is not by any means an out-and-out design. Mr. Camm has given it a large wing area, which makes it a very suitable machine for night fighting; the controls are good and the machine has no vices. The undercarriage track is wide and makes for stability on the ground. The eight machine guns give that intense concentration of fire so desirable when an elusive target is in the sights for a few seconds only. Yet in spite of large size and heavy armament, the Hurricane is at least as fast as the much publicised Messerschmitt. And let us not forget that the Supermarine Spitfire, although it has not yet "won its spurs" in France, has the same armament and is some 30 m.p.h. faster than the Hurricane, being a smaller machine and fitted with the same type Rolls-Royce Merlin engine.

A Wartime Economy

A CERTAIN friend of this paper who was in the Air Ministry in 1918 recalls that on November 11 of that year he could not really grasp the fact of the Armistice until he saw clerks throwing out of the windows of the Cecil Hotel whole handfulls of the buff paper slips on which interdepartmental correspondence had been written. For so long past economy of paper had become a second nature to everyone that this reckless waste was the most striking outward and visible sign that the war was over.

We are already approaching a state of paper shortage in this war. Few people perhaps realise that nearly all the wood pulp and other materials from which paper is made have to be imported from overseas. In these days of U-boats and mines that is sufficient reason for economising paper.

One very simple but effective way of economising is for every reader to place a definite order with a newsagent for the papers he wants to read, and, of course, for *Flight* in particular. The connection may not at first seem obvious, and requires a little explanation. Casual buying at a bookstall almost certainly means one of two things: either that the dealer has ordered sufficient copies for "chance" sales and must return the surplus, or he has not ordered enough and some reader has to be disappointed. This returning of unsold copies of different journals involves quite a serious waste of paper; all over the country it means also a waste of transport—and economy of transport is another wartime necessity. In fact, we must all face the fact that newsagents will soon not risk having unsold copies left on their hands; indeed the Government may in the future prohibit all returns of newspapers and periodicals, and then the casual buyer will often be disappointed.

BRITAIN'S AIRCRAFT INDUSTRY

More Than 30 Different Military Aircraft Types, and a Considerable Number of Civil Machines, Described and Illustrated in This Issue

His Majesty the King takes a keen interest in the R.A.F. and shows a remarkable knowledge of aircraft and their characteristics.

IN accordance with our usual custom we are reviewing, in this and next week's issues of *Flight*, the British Aircraft Industry. Our readers will understand that a good deal of reticence has been forced upon us in dealing with an industry which is so intimately, one might almost say at present exclusively, devoted to war production. Facts and figures have of necessity had to be withheld which would have served to show the almost incredible growth and development that have taken place since *Flight* published its last annual review in October and November of last year.

At that time the expansion of the Royal Air Force was in full swing, and the aircraft industry had prepared itself to meet it. The works of parent aircraft and engine firms had been expanded to cope with what was then considered to be an unprecedented rate of production. The outbreak of war, and the further expansion which has accompanied it, has already made the previous efforts of the industry appear almost half-hearted. To draw a proper picture would involve the disclosure of information the possession of which the enemy would value very highly, and our reasons for refraining will thus be obvious. Readers will have to take our word for it that when once more it becomes possible to publish a full and accurate account of the work now being done by parent aircraft firms, shadow factories, and sub-contractors, the revelation will be staggering.

A Wide Range

In the meantime, although we are not able to disclose rates of output of the different firms, our review this week deals with the products of 18 aircraft-designing firms, which, between them, have been responsible for more than 30 military aircraft types now in service. That, of course, is not the whole story. A very large percentage of these firms has either already flying, or almost ready to fly, new types the existence of which may not even be hinted at. Among them are—again we are compelled to ask our readers to take our word for it—types which are not merely new as regards their detail composition, but which are of a class different from any which have previously been in service with the R.A.F.

In connection with these new types of military aircraft it does not seem out of place to recall here that many months ago *Flight* called attention to the need for taking steps to ensure that such types are put into production without any avoidable delay. By that we did not, of course, mean that thousands of a new type should be ordered "straight off the drawing-board," but merely that provision should be made for a batch of 50 or so to be produced in a minimum of time after the prototype had been flown and found to have no serious vices.

While this batch was being thoroughly tried out by Service pilots the arrangements for real quantity production should be made, so that it might begin as soon as ever the modifications suggested by actual experience in the field had been decided upon. The need for such a policy is, if anything, greater to-day than it was when we first raised the subject. One of the great dangers of wartime rates of output is that a type may be kept in production after it has become obsolete. An equally great danger is that, if very special care is not taken, a new type may be obsolescent before it goes into production. That must be guarded against at all costs. The war, 1914-18, showed that ascendancy in air war is established, at least temporarily, by that side which manages first to get its new types into service. Our designers have produced these new types. It is for the Air Ministry and the aircraft industry between them to find ways and means of either "tapering off" the output of an obsolescent type and working in the new which is to replace it, or—possibly a better alternative—to establish special works in which the latest types are put into small-scale production from the prototype drawings.

FLIGHT and The AIRCRAFT ENGINEER

The BRITISH AIRCRAFT INDUSTRY

NEXT THURSDAY

ENGINES, COMPONENTS and MATERIALS

will form the main subjects of the second special issue of *Flight* to be published on Thursday next, December 7th.

"LIQUID COOLED ENGINES" is the title of an authoritative review of modern practice with a peep into the future by Mr. A. G. Elliott, F.R.Ae.S., M.I.A.E., M.S.A.E., F.R.S.A., Chief Engineer, Aeronautical Division, Rolls-Royce Ltd.

Definite orders should be placed for this second enlarged issue of FLIGHT devoted to the British Aircraft Industry. Sixpence as usual.

One of the earlier type Messerschmitt Me 109 single-seater fighters being refuelled at the Aspern aerodrome near Vienna. The machine has a Junkers Jumo 210 engine of 650 h.p. and quite a low performance.

THE DEFENCE OF VIENNA

On the right is an 88 mm. anti-aircraft gun which forms part of Vienna's defences.

Below is a small-calibre light anti-aircraft gun of the type which would be used to repel low flying attacks. The gun is actually firing and ejected shell cases can be seen on the ground at the right of the picture.

Starting the Jumo 210 engine of a Messerschmitt Me 109 single-seater fighter. The armament of this type is four machine guns.

Teleprinters at work in the headquarters of Vienna's aerial defence organisation.

Some smart, though apparently painful, goose-stepping by personnel of the *Luftwaffe* at the Aspern aerodrome.

KEEP THOSE OVERSEAS MARKETS

By E. C. GORDON ENGLAND

A Strong Argument for Assisting Civil Aviation : The Importance of Export Trade

A TRUTH of to-day is that exports must be kept up to help to pay for the war. It has been stated time and again that the production of military armament cannot be industry's sole contribution to the national defence. Vastly increased imports of certain raw materials and food have to be paid for, and paid for in the main by exports. Civil industry, therefore, has two vital jobs to do. Not only must it continue to supply the needs of home consumers, but also it must retain, and wherever possible extend, its overseas markets.

These are facts which cannot be over-emphasised. Much lip-service has been paid to them. But merely to acknowledge them is not enough. They must be regarded as a basis and a guide for future policy, not only for the duration of the war but in the difficult peace which will follow it. On a thriving export trade will Britain depend for her victory in this war and her survival after it.

Unfortunately, like any other healthy body, industry is susceptible to ill-health in times of stress; and in wartime it is particularly susceptible to three diseases—panic, bureaucratic restriction, and the latter's corollary, defeatism. It was panic that, in the first fortnight of the war, drove civil industry into its shell like a not-too-hardy snail, that swept nearly all advertising from the Press, that made the newspapers shrink, and spread the rumours. It is bureaucratic restriction that hampers industry—industry which has been rapidly regaining confidence—with over-zealous regulations. And it is defeatism that prophesies the inevitable post-war slump but doesn't do anything to prevent it.

No one is more subject to these ills than the manufacturer of civil aircraft; and by no one should they be more stoutly resisted. Admittedly, his is a difficult position. Probably 99 per cent. of his productive capacity is now devoted to military production, and the deliveries required of him are becoming more and more exacting. But if he utilises that "other one-hundredth" of his resources for the design and construction of civil machines, and for challenging foreign competitors in overseas markets, he will be rendering his country—and himself—a triple service. His export sales will be helping Britain's credit, he will be "keeping warm" markets which would otherwise be swamped by foreign competition and for ever lost to this country, and he will be fostering the development of civil aircraft ready for the undoubted demand which will exist, at home as well as abroad, when we have peace again.

Affording the Man-power

It is often said, "In war we cannot spare the man-power from our war effort, however attractive the prospect of securing our civil markets may be"; but do those who use this argument stop to consider the fact that, in spite of all our war preparations and our increased fighting forces, over 1,400,000 people still want work? It would be hardly convincing to say that none of these could be trained to make civil aircraft. And what of the unemployment after the war? All industry must work *now* to ensure that it shall not get out of hand and lose us the peace. There cannot be a manufacturer who will not willingly and wholeheartedly bend all his efforts to this end.

Mr. E. C. Gordon England was a member of the Gorell Committee on Civil Aviation.

To do these things, however, he must have the support of his Government. Without that his enterprise will be "blacked-out"; and on the return of peace he will find himself dazzled by the glare of competition from other countries. He will be another victim of frustrated effort, and consequent defeatism. Helped by the authorities he can succeed; and in spite of the present hindrances and irritations, it seems that help will be eventually forthcoming, although it must not be too long withheld. On September 7th, in the House of Commons, Mr. Oliver Stanley promised, on behalf of the Government, "to use every effort to ensure that the country's exporting capacity would be used to the best advantage," and added that "the Government trusted that manufacturers and exporters in this country would, in the national interest, take the fullest advantage of all opportunities for export." If there be advantage the Government must see to it that it is not lost through official hampering of the manufacturer and agent.

Official Hampering

At present the way is hard. The acquisition of an export licence for aircraft of a purely civil type destined for the Empire is a matter of the greatest difficulty and much negotiation. Advertising overseas is subject to a rigorous censorship; even at home one is advised to use a box number in advertisements, although one's address has appeared in bold type for many years. Amongst the censors themselves there seems to be some confusion, leading to delays in the despatch of publicity material for abroad. All these are matters requiring urgent attention if export trade is to be encouraged.

It will be a tragedy for British aviation if, under the stress of war, civil design and production are allowed to lapse, and hardly won pre-war markets are lost through neglect. When the war is over we have a battle for which we cannot be too well equipped—the battle for sales in the field of commercial aviation. We have, in America, a competitor who is being heavily financed by us at the moment and whose improved productive capacity and resources are directly attributable to the orders placed with her by the Allies. She is ready now to establish a commanding position amongst the aircraft manufacturers of the world. It is up to us to ensure that we remain doughty rivals and competent to maintain a worthy position in world aviation.

Leadership in the art of establishing communications the world over built, and has maintained, the British Commonwealth. To lose that leadership in air communications is unthinkable if our Commonwealth is to fulfil its great destiny.

BRITAIN'S MILITARY AIRCRAFT

A Survey of Our Service Machines

AIRSPEED

THE main resources of the Airspeed concern are now concentrated on the production of Oxford twin-engined military trainers.

The Oxford, although based on the design of the successful Envoy transport machine, which was at one time one of the fastest civil types in the world, is, from the military viewpoint at least, an entirely new design. It was planned to meet the requirements of an Air Ministry specification for a twin-engined trainer incorporating the majority of features common to modern multi-engined military aircraft.

Structurally, the Oxford is a fine example of what can be done with wood. The wings are made in three sections to facilitate transport and repair. The centre section carries the two Armstrong Siddeley Cheetah X seven-cylinder radial engines, the retractable undercarriage and the main fuel tanks. On the sharply tapered outer panels and beneath the fuselage are split trailing edge flaps.

Of semi-monocoque wooden construction, the fuselage has a ply covering applied at an angle of 45 deg. to the datum line. Separating the cabin from the pilot's cockpit is a specially reinforced bulkhead for taking the loads of an overturn landing.

In the cockpit the instruments are mounted on two panels. The blind-flying panel carries a sensitive altimeter, an airspeed indicator, a rate of climb indicator, an artificial horizon and directional gyro and a turn and bank indicator.

For gunnery training a manually-operated turret similar to that fitted on the earlier types of Armstrong Whitworth Whitley bombers is fitted. This will accommodate a Lewis, a Vickers K, or a Browning gun. In the bomb well there is accommodation for sixteen 8½lb. practice bombs, though racks can be supplied for carrying eight 12 kg. or two 100 kg. bombs.

Fittings for wireless, navigational, photographic and oxygen equipment are provided and there is stowage for a Very signal pistol which fires through a protected tube behind the pilot's seat. Aft of the gun turret is provision for two parachute flares.

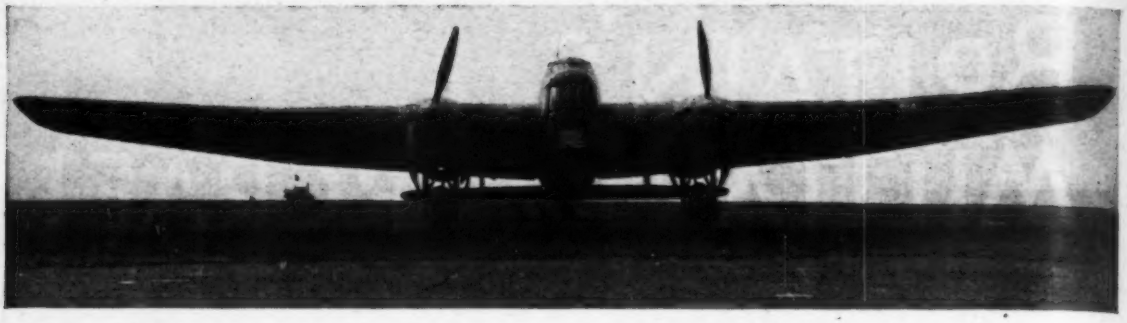
With fixed-pitch wooden airscrews the Oxford attains a maximum speed of 192 m.p.h. at 8,000ft., and will cruise at 164 m.p.h. at 10,000ft., flying at a gross weight of 7,500 lb. Dimensions are: Span, 53ft. 4in.; length, 34ft. 6in.; and height, 11ft. 1in.

Also in production for the R.A.F. at the Airspeed works is the Queen Wasp wireless-controlled target machine. This is a biplane with sharply tapered wings and fitted with an Armstrong Siddeley Cheetah engine. When operating as a target the machine is usually fitted with a float undercarriage, though wheels can be used if desired.

Airspeed (1934), *Ltd., The Airport, Portsmouth.*

"Flight" photograph.

The Airspeed Oxford twin-engined trainer resembles first-line military types not only in handling characteristics, but in appearance.



A Merlin-engined Armstrong Whitworth Whitley bomber as now in service with the Royal Air Force.

ARMSTRONG WHITWORTH

FOR some time the extensive production facilities of the Armstrong Whitworth works have been used for the large-scale production of Whitley twin-engined bombers.

From the original Mark I version with Siddeley Tiger IX radial engines this type has been developed into the Whitley V, which, like the Mark IV, mounts liquid-cooled Rolls-Royce Merlins.

The cantilever wing of the Whitley is built round a box spar which has vertical corrugated walls and, top and bottom, span-wise corrugations. The outer panels are slightly tapered and have a marked dihedral angle. Extending from aileron to fuselage on each side are hydraulically operated trailing-edge flaps. The ailerons are of the Frise type.

Unusual in that it tapers little in depth, the fuselage, like the wing, is constructed in three sections. Structurally, it is a metal monocoque with smooth sheet covering riveted to the stringers, the latter being supported by hoops.

The tailplane is set low on the fuselage and carries two braced fins set well inboard from the tips.

In both Merlin and Tiger versions the undercarriage retracts forward into the engine nacelles. There are three main fuel tanks, two in the wing and one in the fuselage.

The crew is normally five and there are power-operated gun turrets in the nose, amidships and in the tail. The midships position takes the form of a retractable "dustbin" which is rotatable through 360 deg. Bombs are stowed in the centre section of the wing and in the fuselage, the doors to the bomb cells being retained in the closed position during flight by spring loading.

Marks II and III are fitted with a pair of two-speed supercharged Armstrong Siddeley Tiger VIII fourteen-cylinder air-cooled engines on welded steel-tube mountings.

Performance figures for the Whitley V may not be quoted, but the Mark IV version has a top speed of 245 m.p.h. The Whitley III with Tiger VIII engines, which deliver 1,610 h.p. (combined) for level flight at 15,000ft., is capable of 215 m.p.h. at that height, the cruising speed at the same altitude being 177 m.p.h. on 66 per cent. power. Dimensions are: Span. 84ft.; length, 69ft. 3in.; height, 15ft.; and wing area, 1,323 sq. ft. Empty the machine weighs 15,750 lb., the gross weight being 24,000 lb. The good handling characteristics and the low stalling speed of 59 m.p.h. makes the Whitley very suitable for night flying.

Sir W. G. Armstrong Whitworth Aircraft, Ltd., Whitley, Coventry.

AVRO

SOME years ago the Avro Company developed a small twin-engined transport aircraft of high efficiency. At the time the Air Ministry required a machine for general reconnaissance work and decided that this little Avro transport, modified for military use, would meet their requirements. Accordingly, large orders were placed for the militarised version, which was named the Anson and which is now in service in very large numbers not only as an over-water reconnaissance type, but as a trainer.

The Anson, or Avro type 652A, is a low-wing twin-engined monoplane with a retractable undercarriage. Structurally the machine is interesting in that bakelite plywood is used extensively in the stressed skin wooden wing while the fuselage is of welded steel tube construction with fabric covering. The Avro Company claim that the wing will never need complete overhaul and that, in the event of a crash, the steel fuselage has a higher shock absorbing capacity than one of wood.

The normal crew for military operations is three men—pilot, navigator-bomb aimer and wireless operator-gunner. The stations of these are on the port side of the fuselage, the starboard side being free for their passage to and fro when they require to change position.

The pilot has a fixed gun and behind the cabin is an Armstrong Whitworth manually operated gun turret. In order to avoid damage to the airscrews when the turret gun is being fired forward, the limits of the field of fire are marked by broad red and black lines on the upper surface of the wing.

A light bomb load is accommodated in the centre section of the wing.

Two Armstrong Siddeley Cheetah IX engines are carried on welded tubular steel mountings and drive Fairey fixed-pitch metal airscrews.

In its present form the Anson, which has a span of 56ft. 6in., a length of 42ft. 3in. and an all-up weight of 8,000 lb., is capable of 180 m.p.h. at 7,000ft.

In addition to Ansons the Avro concern has built large quantities of Blenheim high-speed bombers.

A. V. Roe and Co., Ltd., Newton Heath, Manchester 10.

The ubiquitous Avro Anson is in service not only in the R.A.F. but in the air forces of several other countries. The machines shown are Australian.

BLACKBURN

THE Skua fleet fighter dive-bomber, which has been in production in the Blackburn works for some time past, was the first monoplane to be adopted for use from British aircraft carriers.

Operationally, as well as structurally, the Skua is of quite exceptional interest as its unique flaps not only facilitate take-off and landing, but are used in bombing dives to limit the speed to about 220 knots, enabling the machine to approach close to its target and release its bomb with great accuracy.

The low cantilever wing is built in three portions, the centre section, the upper surface of which forms the bottom of one of the watertight compartments provided, being bolted under the fuselage. This centre section comprises two box spars, flanged plate ribs, Z-section stringers and plating attached by flush and hollow rivets. The outer panels are of similar construction except that the main spars are of box section only for part of their length, changing to single webs toward the tips. Watertight flotation compartments are provided between the spars forward of the ailerons. Near the roots are circular recesses which accommodate the wheels of the retractable undercarriage.

The metal monocoque fuselage is built in two sections which are joined just forward of the fin. It contains two watertight compartments, one under the floor of the pilot's cockpit, and the second aft of the gunner's position. The cockpit itself is watertight up to the coaming.

The Blackburn Skua (Bristol Perseus XII) is a two-seater fleet fighter dive-bomber used by squadrons of the Fleet Air Arm.

A distinctive feature of the Skua is the tail, in which the vertical surfaces are set well forward in relation to the tailplane and elevator. The explanation of this arrangement is that for stowage in the hangars of aircraft carriers dimensions have to be kept down to a minimum.

The engine of the Skua is the Bristol Perseus XII sleeve-valve radial, which gives a top speed of 225 m.p.h. and a service ceiling of 20,200ft. Dimensions are: Span, 46ft. 2in.; length, 35ft. 7in.; and wing area, 312 sq. ft.

The Blackburn Company is also responsible for the design of the Roc two-seater fleet fighter, which will be dealt with under "Boulton Paul."

The company has also delivered large numbers of Shark T.S.R. aircraft to the Fleet Air Arm.

Blackburn Aircraft, Ltd., Brough, E. Yorks.

BOULTON PAUL

GREAT BRITAIN, more than any other country, has developed power-operated turrets which permit the accurate firing of a battery of guns from an aircraft flying at a very high speed. The Boulton Paul concern were pioneers in turret development, so it is by no means illogical that they should be charged with the design and production of a high-speed two-seater "turret" fighter for the Royal Air Force and with the production of a two-seater fleet fighter—the Blackburn Roc—which mounts similar armament.

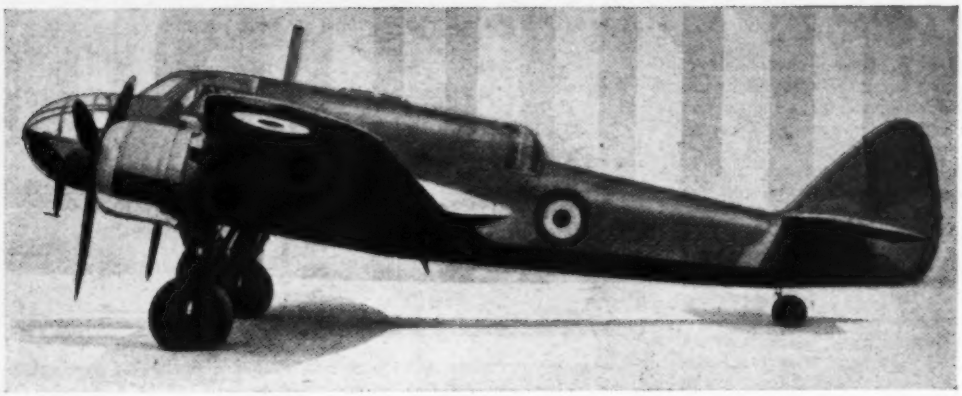
The Defiant, as the R.A.F.'s new two-seater is known, is a very shapely, low-wing cantilever monoplane of all-metal construction. The engine is one of the newer types of Rolls-Royce Merlin and drives a three-bladed variable-pitch airscrew. Behind the enclosed pilot's cockpit is the rotatable multi-gun turret, details of which have not yet been made available for publication. It may be said, however, that the armament of the machine is concentrated in this turret, which has a wide field of fire and is extremely quick and smooth in operation.

The Defiant may not yet be described in detail, but the wing tapers in thickness from the centre to the tips and comprises a centre section with a slight taper in chord and more heavily tapered outer sections with rounded tips. Split flaps are fitted over the inner part of the span and Frise ailerons to the outer.

The Roc, which is also produced by Boulton Paul, is of Blackburn design and in general resembles the Skua already described. The armament, however, is similar to that of the Defiant, being concentrated in the turret, whereas the Skua has guns in the wing and a single rear gun on a manually operated mounting.

Boulton Paul Aircraft, Ltd., Wolverhampton.

Both the Blackburn Roc (top) and the Boulton Paul Defiant (below) are fitted with a Boulton Paul multi-gun power-driven turret. The Roc, which was designed for service with the fleet, has a Bristol Perseus engine while the Defiant has a Rolls-Royce Merlin. Both types are built by Boulton Paul Aircraft, Ltd.



One of the newest types to go into service with the R.A.F. is the Bristol Beaufort (two Taurus engines) which can function as a bomber, reconnaissance machine, torpedo carrier, or general purpose type.

BRISTOL

THE highly successful Bristol Blenheim high-speed monoplanes have already distinguished themselves in the war by making some outstanding bombing raids and reconnaissance flights.

The development of the Blenheim is of unusual interest. In the first place the design was evolved from that of a very fast transport machine known as the Bristol 143. It was, however, rearranged as a midwing type to enable the bombs to be stowed in the centre section of the fuselage. The nose and certain other components were redesigned and a power-driven gun turret fitted in addition to a fixed gun in the wing. The engines selected for the military version were the highly supercharged Bristol Mercury VIIIs. Actually, the Blenheim was the first modern all-metal monoplane to go into production as a bomber for the Royal Air Force.

The majority of the machines in service are of the original "short-nosed" or Mark I type, though structurally these are similar to the improved version which will be referred to later.

The fuselage is of light-alloy monocoque construction and is built in three sections. These, and the centre section of the cantilever wing, are united by bolting only, the outer sections being attached in a similar manner. The wing, which is also in three parts, embodies two main spars with steel flanges and Alclad webs with ribs of Alclad sheet. Alclad covering is common to the wing and fuselage.

The crew consists of the pilot, a bomb aimer-navigator and a wireless operator-gunner.

Data for the "short-nosed" Blenheim are: Top speed, 285 m.p.h. at 15,000ft.; service ceiling, 27,250ft.; and range at a nominal speed of 200 m.p.h., 1,125 miles. The span is 56ft. 4in.; length 39ft. 9in.; the empty weight 7,409 lb. and the all-up weight 12,030 lb.

Although generally referred to as a bomber, the Blenheim is potentially a formidable twin-engined fighter and is, in fact, utilised by certain squadrons of the R.A.F. in this capacity. Moreover, thanks to its speed and the good visibility, it is a first-rate strategical reconnaissance aircraft.

The latest version of the Blenheim (Mark IV) is popularly known as the "long-nosed" type, due to the fact that the accommodation for bombing and navigation has been improved with a resultant increase in the length of the nose. Whereas the earlier Blenheims had the standard Mercury VIII engines, the Blenheim IV is powered with a somewhat improved version of this unit, known as the Mercury XV. This gives 920 h.p. for take-off when 100 octane fuel is used, the extra power permitting a greater fuel load to be carried, enough, in fact, to give a range of 1,900 miles.

The empty weight of the Blenheim IV is 8,100 lb. and the loaded weight 12,100 lb. A top speed of 295 m.p.h. is easily attained at 15,000ft. and the rate of climb is quite phenomenal, the climb to 20,000ft. being only 17 minutes.

Reference to the Bristol Bombay bomber transport is made under "Short and Harland."

The Bristol Aeroplane Co., Ltd., Falcon House, Bristol.

DE HAVILLAND

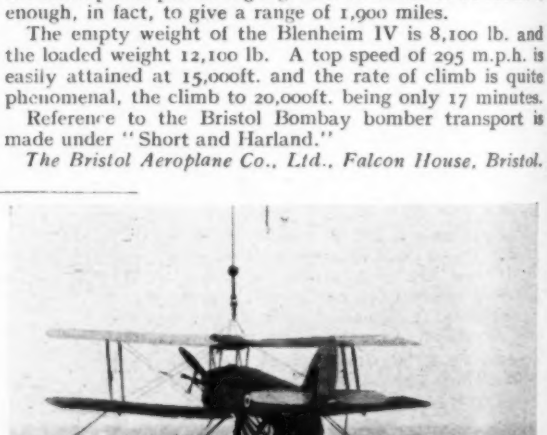
MANY hundreds of De Havilland Tiger Moth biplane trainers have been built for the instruction of pilots of the Empire. The Tiger Moth is a sturdy two-seater with a D.H. Gipsy Major engine. It is extremely manœuvrable and can be used for preliminary, advanced, aerobatic, and blind-flying instruction. Its all-up weight is 1,825 lb. and the top speed 110 m.p.h.

A version built for use in Canada has a cockpit enclosure and, like all Tiger Moths, can have wheels, floats or skis.

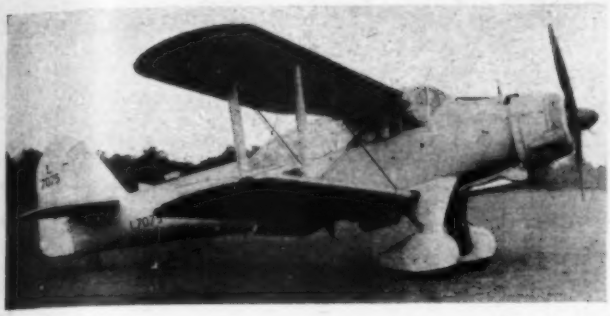
The company has also delivered a number of its Don aircraft for Service communications work. The Don is a low-wing monoplane with a single D.H. Gipsyking (Gipsy Twelve).

Comparatively recently the company has received a substantial order for a military version of the Flamingo high-speed twin-engined transport as a troop carrier. With two Bristol Perseus sleeve-valve engines, the Flamingo is capable of 234 m.p.h. and cruises at 210 m.p.h. A picture is included in the section of this issue dealing with civil aircraft.

The De Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts.



The design of the De Havilland Queen Bee wireless-controlled target machine is based on that of the Tiger Moth trainer. The machine is of all-wooden construction; this improves the flotation qualities.



On the left is the new Fairey Albacore biplane for the Fleet Air Arm. It has a Bristol Taurus fourteen-cylinder sleeve-valve engine and can be used for dive-bombing, torpedo-dropping, spotting or reconnaissance. Below is the Fairey P.4/34 light bomber or two-seater fighter and, beneath it, the Battle bomber which is now operating from some of our aerodromes in France.

FAIREY

TWO types of Fairey aircraft have already distinguished themselves in the war—the Battle and the Swordfish.

The Battle is a fairly large single-engined bomber fitted with a Rolls-Royce Merlin. It carries a crew of three and in its present form is armed with one fixed and one free machine gun. The construction is of the stressed-skin type throughout, except for the portion of the fuselage in the region of the pilot's cockpit, which is a built-up structure of steel tubes.

The top speed of 257 m.p.h. is attained at 16,000ft. A disposable load of 4,125 lb. can be carried and the range is 1,000 miles.

Reproducing many characteristics of the Battle the Fairey P.4/34 two-seater military monoplane is smaller and of even cleaner design. Unlike the Battle, it carries its bomb load externally. It is eminently suitable for use as a two-seater fighter and has, in fact, been ordered by Denmark for that purpose. As a fighter it carries a formidable armament of machine guns.

The Fairey Swordfish torpedo spotter reconnaissance biplane, although a comparatively old type, is doing excellent work. It is a two-three-seater fitted with a Bristol Pegasus engine and can be fitted with interchangeable wheel or float undercarriage.

As a successor to the Swordfish, the company has produced the Albacore. Like the Swordfish, it can be used for dive-bombing, reconnaissance, spotting or torpedo dropping. A single Bristol Taurus engine is fitted and drives a three-bladed constant-speed airscrew. Flaps are fitted to the bottom wings.

With wheel undercarriage the Albacore has the following dimensions: Span, 50ft.; length, 39ft. 10in.; and height, 14ft. 2¼in.

The Fairey Aviation Co., Ltd., Hayes, Middlesex.

GLOSTER

THE Gloster Gladiator single-seater fighter biplane is by now so familiar that structural description is hardly warranted, particularly in view of the fact that the following details are now available of the latest Gladiator II. This has a Mercury VIIIA engine, of the type built in the shadow factories, with automatic mixture control carburettor and Hobson control box; a flying instrument panel with B.3 vacuum pump; desert equipment, consisting of a two-gallon water tank, Service water bottle, emergency ration container, tool kit, ground signalling strips, sand excluders and Vokes air cleaner, and a larger accumulator for electric starting from the cockpit.

The armament is four Browning machine guns and the top speed is 255 m.p.h. at 15,000ft. The climb to 20,000ft. takes only nine minutes and the service ceiling is as high as 32,800ft.

The Sea Gladiator fleet fighter, which is doing excellent work with the Fleet Air Arm, is generally similar except that it has an arrester hook and a dinghy, which is enclosed in a removable container below the fuselage.

The Gloster Company is also responsible for the construction of a large number of Hawker Henley single-engined bombers (Rolls-Royce Merlin). The Henley has been adopted by the R.A.F. as the standard high-speed target-towing aircraft and is doing work of great value at our armament training stations. The top speed is over 270 m.p.h.

In many respects the Henley resembles the Hurricane. Bombs are carried internally in the centre section of the fuselage, the fairing for the bomb compartment merging with that of the nose-type radiator for the engine.

The crew is accommodated in a finely streamlined cockpit enclosure and comprises pilot and rear gunner, the latter having a manually-operated gun or a rotatable hydraulically-operated turret.

In its target-towing form the Henley has special equipment in the rear cockpit.

The Gloster Aircraft Co., Ltd., 3, St. James's Square, London.

"Flight" photograph.

Among the finest aerobatic machines in the world to-day is the Gloster Gladiator single-seater four-gun fighter which, despite the fact that it is of comparatively old design, is still extremely popular. A similar machine known as the Sea Gladiator is in use as a fleet fighter.

Fitted with two Bristol Pegasus XVIII engines the Handley Page Hampden bomber has a top speed of 265 m.p.h. It is armed with four machine guns.

HANDLEY PAGE

BOMBING aircraft have always been the Handley Page *forté*. Latest of the line to go into service with the R.A.F. is the Hampden, a twin-engined, mid-wing monoplane of unorthodox appearance. The wings are sharply tapered, and the fuselage, though of clean design, is unusual in that the rear part becomes abruptly small, lessening the wetted area, and permitting a good field of fire for the rear guns.

The fine performance of the Hampden is due in a large measure to the fitting of Handley Page automatic slots and hydraulically operated split flaps. The machine is of all-metal construction with flush-riveted, stressed-skin covering. Of cantilever type, the tail has twin fins and rudders.

The engines are two Bristol Pegasus XVIIIs fitted with two-speed superchargers and driving three-bladed De Havilland constant-speed, variable-pitch airscrews.

Bombs are stowed in the centre section, and there are four machine guns. One of these is fixed in the nose and is fired by the pilot; a second fires downward from the nose; the third is operated from on top of the fuselage roughly in line with the trailing edge of the wing; and the fourth is mounted to fire rearward and downward from the lower end of the box-like forward section of the fuselage.

The crew consists of a pilot, navigator-bomber, wireless operator-gunner, and lower rear gunner.

Dimensions are: Span, 69ft. 4in.; length, 53ft. 4in.; wing area, 668 sq. ft.; weight, empty, 11,780 lb.; gross weight (normal), 18,756 lb.; top speed, 265 m.p.h. at 15,500ft.; cruising speed (normal r.p.m.), 217 m.p.h.; economical cruising speed, 167 m.p.h.; service ceiling, 22,700ft.; maximum range at economical speed with 2,587 lb. load, 1,790 miles.

Handley Page, Ltd., Cricklewood, London, N.W.2.

HAWKER

THE Hawker Hurricane single-seater fighter has been in service with the R.A.F. long enough for pilots to decide that it is just as outstanding as its forerunner, the Fury biplane of such fond memory.

Steel and duralumin are used in the construction. The longerons, between which the struts run in zigzag fashion in the vertical plane and transversely in the horizontal plane, are of circular section tube. A secondary structure of wood carries the fabric covering, which extends from the stern post to about the level of the pilot's seat. In front of this point the covering is in the form of light-metal panels which continue the smooth curves of the cowling.

The wing construction is an ingenious adaptation of old methods to new requirements. In a general way the spars resemble those of the earlier Hawker biplanes, i.e., they have bulbous steel booms of polygonal section at the top and bottom and a central web of flat sheet. In the centre section, which is a single unit extending about three feet on each side of the fuselage, the web is solid and stiffened by riveted-on vertical channels. The drag members, which run zigzag fashion between the spars, are almost identical with the spars as regards their form and construction, though slightly smaller. The attachment of the wing fabric to the ribs is extremely strong. When the fabric has been placed over the wing, a metal strip is put over each rib channel and secured to it by Simmonds elastic stop nuts. As these are tightened the fabric is drawn into the channel of the rib, and is thus held by the whole area of the strips. The covering of the inner portion is of metal.

Hydraulically operated split trailing-edge flaps are fitted on the inner section of the wings. The ailerons are of the Frise type.

A Rolls-Royce Merlin II or III engine is mounted on a simple steel tube structure, the radiator being placed well aft in its fuselage. Although the first Hurricane had two-bladed wooden fixed-pitch airscrews, all current machines have three-bladed variable-pitch types.

Armament consists of eight Browning machine guns placed four in each wing, and full day and night fighter equipment is carried.

Fitted with a fixed-pitch airscrew and flying at a weight of 6,180 lb., the Hurricane climbs to 17,500ft. in 7.8 minutes, and at that height has a top speed of 330 m.p.h. The landing speed is 62 m.p.h., and the service ceiling 34,000ft. Cruising at 200 m.p.h., the duration is 4.25 hr. (850 miles).

With the De Havilland two-position v.p. airscrew, the weight is 6,380 lb., and the top speed remains in the neighbourhood of 330 m.p.h. The climb to 20,000ft. takes ten minutes. The latest Hurricanes are being fitted with constant-speed Rotol airscrews, which give approximately the same speeds; but, although the all-up weight is about 6,300 lb., the time of climb to 20,000ft. is less than nine

"*Flight*" photograph.

The 330 m.p.h. eight-gun Hawker Hurricane fighter showing its layout and the clean installation of the Rolls-Royce Merlin engine

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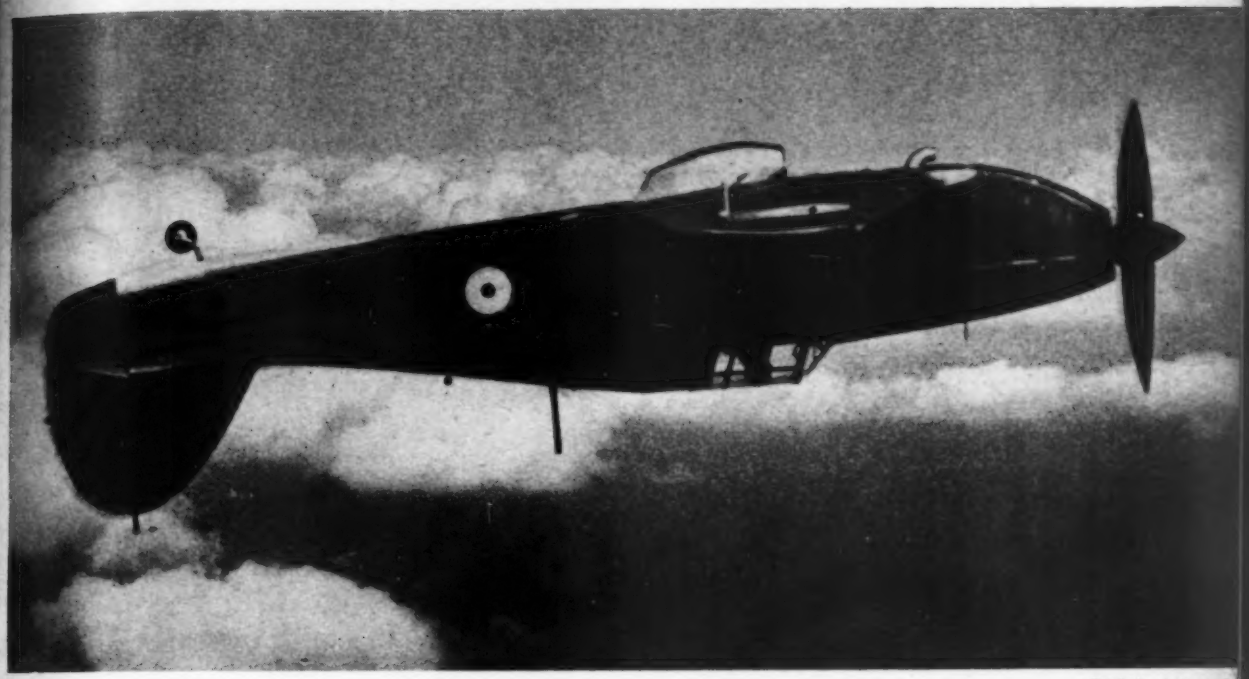


"Flight" photograph.

SINGLE-SEATER SUPREMACY

Without a doubt our Hawker Hurricane I and Supermarine Spitfire I single-seaters are the finest fighting aircraft in general service to-day. Both types are very fast (the Hurricane does 330 m.p.h. and the Spitfire 367 m.p.h.) and in each case the armament is eight Browning machine guns though shell-firing guns can be fitted alternatively. In spite of their exceptional performance both machines can out-manœuvre many foreign single-seaters for which their manufacturers have claimed good manœuvrability rather than speed. Both types have already been in action.

In the top picture a Hurricane is seen half-way round a roll and below is an eloquently accurate formation of Spitfires.

As individual in appearance as they are outstanding in performance, the Handley Page Hampden I Bomber (top) and the Saunders-Roe Lerwick flying boat are both in Service with the R.A.F. The Hampden is powered with two Bristol Pegasus XVIII nine-cylinder radials with two-speed superchargers, while the Saro boat is fitted with a pair of Bristol Hercules fourteen-cylinder sleeve-valve units giving a maximum output of something like 1,400 h.p. each.

While the Lerwick makes use of power-driven gun turrets the Hampden retains manually operated armament which, thanks to the design of the machine, can be very effectively employed.

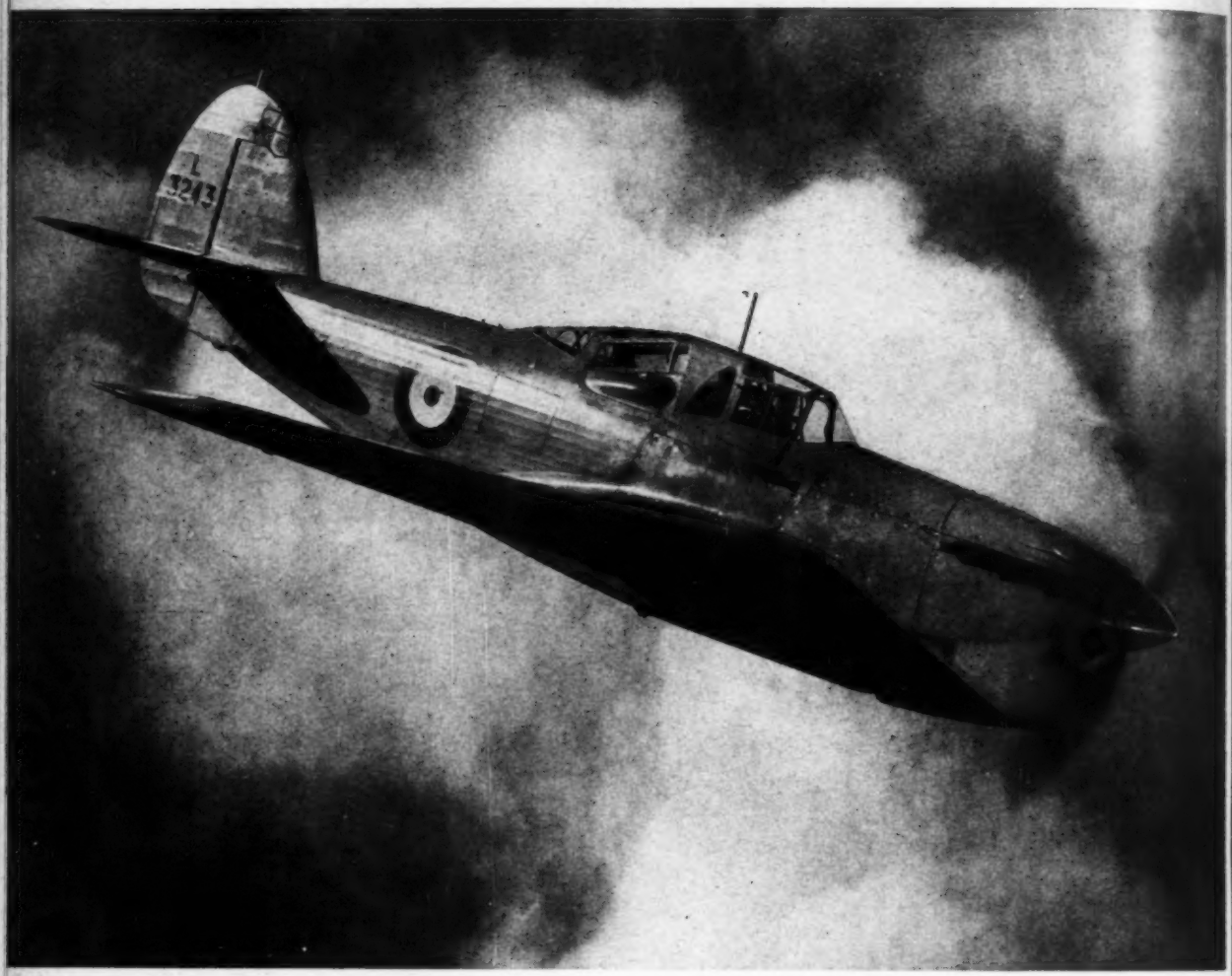
THROUGH EARTHLING'S EYE

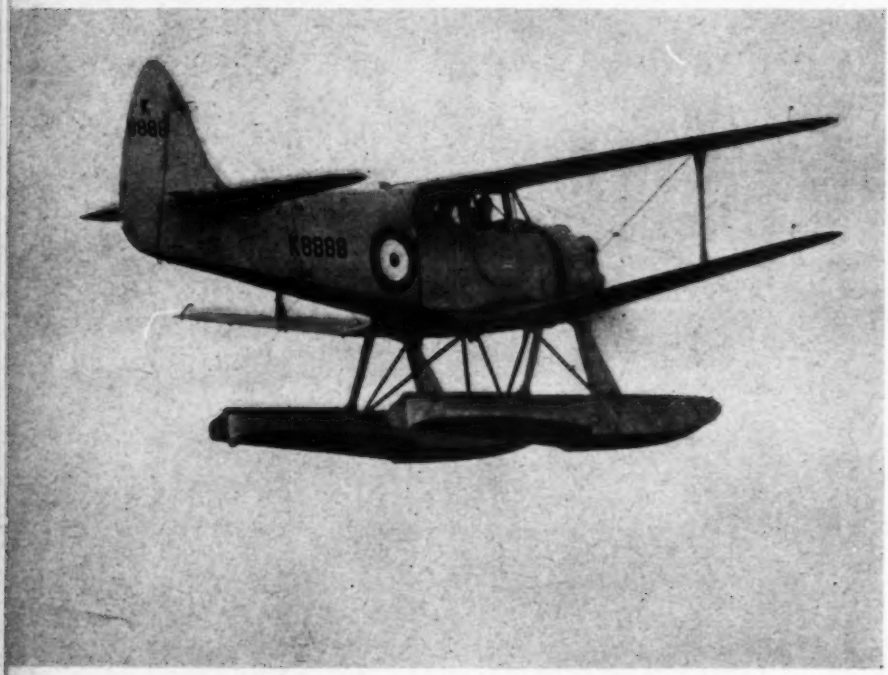
"Flight" photographs

THE LONG and SHORT OF IT

On the right is an intimate study of the "long-nosed," or Mark IV, version of the Bristol Blenheim which is slightly superior in performance to the original "short-nosed" Blenheim as shown below. Powered with two Bristol Mercury XV nine-cylinder radials giving a take-off output, on 100-octane fuel, of 920 h.p. each, the Mk. IV machine can fly non-stop for 1,900 miles. The top speed is 295 m.p.h. and the climb to 20,000ft. takes only 17 minutes.

"Flight" photographs.





HOME ON THE RANGE

The past two or three years have seen some quite astonishing improvements in the performance of military aircraft, and correspondingly faster machines are required to tow drogue targets for "air-to-air" gunnery practice.

The Hawker Henley (above), originally planned as a light bomber and capable of over 270 m.p.h., was selected for the work and is providing valuable practice for our Hurricanes and Spitfires. It has a Rolls-Royce Merlin engine. Equally valuable in that it will provide better practice for our anti-aircraft guns is the Airspeed Queen Wasp (below) which is the latest of our wireless-controlled aircraft. It is fitted with a seven-cylinder Armstrong Siddeley Cheetah engine.

"Flight" photographs.

WITH THE ARMY AND NAVY

Undoubtedly the most efficient machine of its type in the world, the Westland Lysander (top) is a two-seater army co-operation monoplane. Its duties include spotting for the artillery, reconnaissance and general co-operation with ground forces. It has three machine-guns and can carry bombs or supply containers on stub wings which are attached to the undercarriage. The engine is a sleeve-valve Perseus. In our picture the parachute of a supply container is seen opening just after release. The business-like biplane on the right is the Gloster Sea Gladiator, a highly manoeuvrable four-gun fighter used by the Fleet Air Arm. Below the fuselage in a streamlined container is a collapsible dinghy for the use of the pilot in the case of a forced descent.

Like the Lysander, the Gladiator makes use of Dowty internally sprung wheels which permit a very clean design of undercarriage to be used.

"Flight" photograph

DOWN TO THE SEA

Short Sunderlands of the type shown on the left are in service in considerable numbers in squadrons of the Royal Air Force. They can be used for patrol, reconnaissance, convoy work or bombing, and have already distinguished themselves by rescuing thirty-four members of the crew of the *Kensington Court* and by making valuable long-distance over-water flights. The Sunderland is powered with four Bristol Pegasus XXII engines.

Below is a pleasing glimpse of a formation take-off by a flight of Supermarine Stranraer flying boats. Although these are biplanes they have a very useful performance. They are powered with two Bristol Pegasus X engines.

ANTI U-BOAT

The Blackburn Skua (above) is a new two-seater fleet fighter dive-bomber powered with a Bristol Perseus sleeve-valve engine. It has five machine guns and is fitted with special flaps for retarding the speed in a bombing dive, permitting greater accuracy of aim. Below is a Fairey Swordfish floatplane at the moment of leaving the catapult of a warship. Swordfish operate from the decks of aircraft carriers, from the catapults of cruisers and other ships, and from shore bases. They can be equipped for reconnaissance, gunnery spotting and bombing, and have already made themselves unpleasant to U-boats.

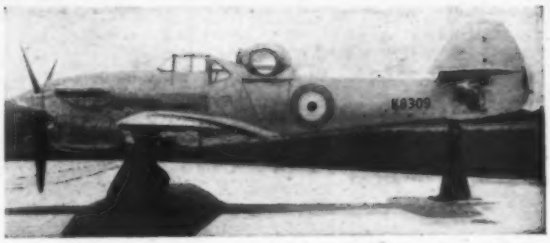
TRAINER TRIO

Efficient first-line military aircraft demand correspondingly efficient trainers. In the Royal Air Force biplane trainers—as typified by the De Havilland Tiger Moth—are still doing extremely useful work, though the trend is undoubtedly towards monoplanes. Smallest of the monoplane trainers is the Miles Magister (D.H. Gipsy Major). A line-up of these machines is seen in the bottom photograph. For more advanced work we have the Airspeed Oxford twin-engined machine (centre) and the Miles Master (top). The Oxford, powered with two Armstrong Siddeley Cheetah engines, does over 190 m.p.h., while the Master, with its Rolls-Royce Kestrel XXX, will attain 250 m.p.h. All three types reproduce the characteristics of modern military monoplanes.

minutes. Take-off is exceptionally good, being less than 200 yards.

An experimental two-seater fighter produced just after the Hurricane was the Hotspur. This machine is closely related not only to the Hurricane, but to the Henley two-seater bomber to which reference is made under "Gloster." The engine is a Rolls-Royce Merlin driving a three-bladed variable-pitch airscrew and cooled by a ducted nose-type radiator. Behind the pilot's cockpit enclosure is a multi-gun power-driven turret. As in the other Hawker monoplane types, the undercarriage retracts in an inward direction and is of wide track.

Hawker Aircraft, Ltd., Canbury Park Road, Kingston-on-Thames.



The Hotspur was an experimental two-seater fighter built by the Hawker Company some time back.

MARTIN-BAKER

A TYPE of construction which makes for rapid production is perhaps the most outstanding characteristic of the Martin-Baker single-seater multi-gun fighter. This aircraft is unique among British military types in that its length is greater than its span, the wings measuring 34ft. and the fuselage 34ft. 6in.

The undercarriage is of the fixed trousered type and carries the oil coolers for the 24-cylinder Napier Dagger air-cooled engine.

During a demonstration this year it was shown that the machine was very manœuvrable, the tightness of the turns being particularly impressive.

Quickly detachable panels are fitted round the fuselage, and the cockpit enclosure is unique in that the main portion hinges back toward the starboard side, allowing not only easy entry and exit, but access to the front and back of the instrument panel.

The Martin Baker Aircraft Co., Ltd., Higher Denham, Bucks.

"Flight" photograph.

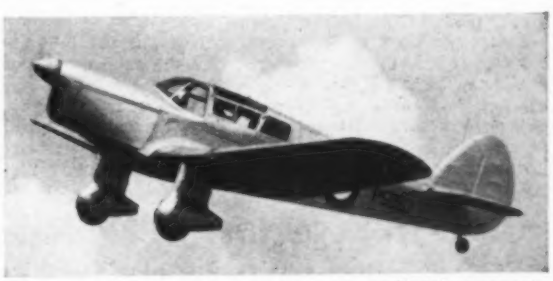
The Martin Baker multi-gun fighter is of unusual appearance. It is fitted with a Napier Dagger twenty-four cylinder air-cooled engine and is of very simple, but sturdy, construction.

PERCIVAL

COMMERCIAL and private-owner aircraft have been developed by the Percival concern to meet R.A.F. and Fleet Air Arm requirements. For example, Vega Gulls have been delivered to the R.A.F. for general liaison flying and a similar machine known as the Proctor has been developed as a three-seater for deck landing, wireless and navigational training and communication. A number of Q6s—low-wing monoplanes powered with two Gipsy Sixes—has also been delivered to the Air Ministry.

The Proctor is fitted with long-chord split trailing-edge flaps similar to those on the Vega Gull. These reduce the landing speed to 44 m.p.h., and, in conjunction with wheel brakes, allow the machine to be landed in a small space. With a Gipsy Queen (Gipsy Six) engine and flying at a load weight of 3,250 lb. the machine has a top speed of 180 m.p.h. and will cruise at 172 m.p.h. at 7,000ft. The range with standard tankage is 600 miles.

Percival Aircraft, Ltd., Luton Airport, Beds.



"Flight" photograph.

One of the Vega Gulls (D.H. Gipsy Queen engine) supplied to the Air Ministry.

PHILLIPS and POWIS

TRAINING aircraft of low and high power are in large-scale production at the Phillips and Powis works.

The smaller of the two types is the Miles Magister, a two-seater monoplane of wooden construction designed for *ab initio* training, which is claimed to reproduce the characteristics of modern high-performance machines. It is fully aerobatic and its range of 400 miles is ample for cross-country flying training. With a Gipsy Major engine the top speed is 145 m.p.h. The landing speed is 45 m.p.h. and the service ceiling 18,000ft.

Larger, faster and of somewhat later design, the Master two-seater advanced trainer has a higher performance than any corresponding training machine in the world.

The oval-section plywood-covered fuselage is of excellent aerodynamic form and of semi-monocoque construction. Between the tandem cockpits (the pupil occupies the front seat) is a sturdy metal former which offers protection for the crew in the event of a nose-over. The plywood-covered wing is of N.A.C.A. 230-section and of inverted-gull form.

The nose of a Miles Master advanced trainer (Rolls-Royce Kestrel XXX). It will be seen that the radiator is mounted under the fuselage behind the engine.

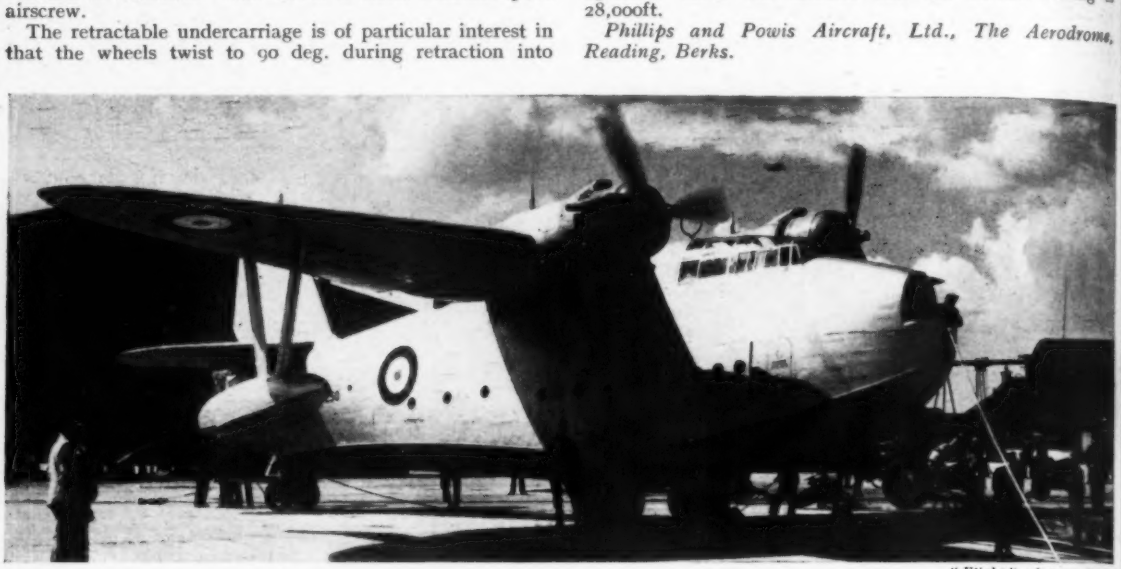
Hydraulically operated split trailing-edges extend beneath the fuselage.

A Rolls-Royce Kestrel XXX engine, rated at 550 h.p., is fitted as standard. This drives a Rotol constant-speed airscrew.

The retractable undercarriage is of particular interest in that the wheels twist to 90 deg. during retraction into the centre section. The usual indicators are fitted.

At 15,000ft. the Master is capable of 264 m.p.h. and cruises on two-thirds power at 230 m.p.h. The climb to 15,000ft. takes ten minutes and the service ceiling is 28,000ft.

Phillips and Powis Aircraft, Ltd., The Aerodrome, Reading, Berks.



"Flight" photograph.

SAUNDERS-ROE

A deep hull, sharply tapered wings and V-shaped float struts characterise the fast Saro Lerwick flying boat as now in service with the R.A.F.

FOR some years the sturdy London biplane flying boat has done excellent service with general reconnaissance squadrons of the Royal Air Force.

This type has been out of production for quite a while, giving place to the Lerwick monoplane.

Full particulars of the Lerwick may not yet be published. It may be said, however, that the engines are two of the new Bristol Hercules 14-cylinder sleeve-valve radials, driving De Havilland constant-speed airscrews. The main defensive armament is carried in power-driven gun turrets in the bow and stern, and a heavy weight of bombs can be accommodated. It will be seen from our picture that the hull is very deep and that the planing bottom extends almost to the tail.

Each wing-tip float is mounted on two struts which, while being flexible for shock-absorbing purposes, are claimed to be equal in strength to the normally braced type.

Figures for the performance are not available, but the Lerwick is certainly among the fastest military flying boats in the world and should have an exceptionally long range.

Dimensions are: Span, 81ft.; length, 63ft.; and height, 20ft.

Saunders-Roe, Ltd., East Cowes, Isle of Wight.

SHORT

GREAT BRITAIN has more four-engined military flying boats in service than any other country. These machines are of the Short Sunderland type, which resembles the Empire commercial class in many respects but differs in certain interesting details. The installation of more powerful engines has enabled the machine to operate at a greater all-up weight.

The tapered wings are fitted with Gouge "dragless" flaps, and the hull is of monocoque construction, the rear step being faired into a characteristic knife edge.

Four Bristol Pegasus XXII engines are fitted and drive De Havilland two-position airscrews. These are fitted in monocoque nacelles forward of the leading edge.

The interior is arranged in two storeys, the pilots' position being on the upper one. The lower deck embodies the mooring compartment, lavatory, officers' wardroom,

The impressive appearance of the big four-engined Short Sunderland is accentuated by the "sea-camouflage"

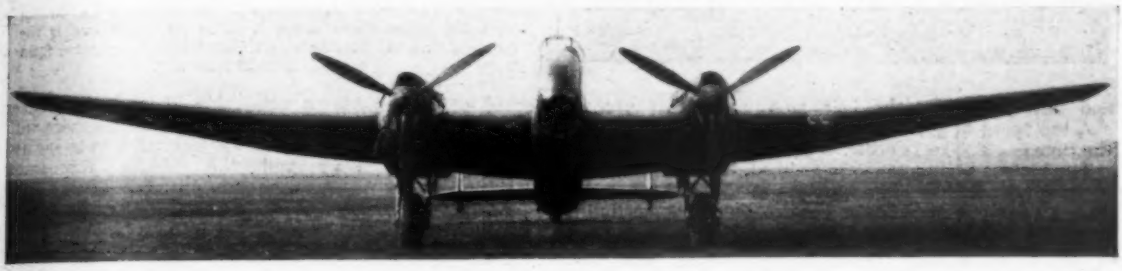
galley and quarters for the crew. The wardroom and crew's quarters have bunks and folding tables.

The Sunderland has six fuel tanks in the wing, three on each side of the hull. The inboard pair of tanks hold between them 1,058 gallons; the intermediate pair 711 gallons, and the outer pair (employed in the overload condition) hold 265 gallons.

Apart from a heavy bomb load, accommodated in the hull, there are two Nash and Thompson power-driven gun turrets (bow and stern) and two 'midships gun positions.

The Sunderland is the largest machine now operating in the R.A.F., having a span of 112ft. 9½in., a length of 85ft. 4in., and a wing area of 1,487 sq. ft. The weight empty is 28,290 lb., and the normal all-up weight 45,700 lb., the weight in the "overload" condition being 49,870 lb. The top speed is 210 m.p.h., and the maximum cruising speed 178 m.p.h. At sea level the rate of climb is 1,200ft.-min. The "overload" range is 2,500 sea miles.

Short Bros. (Rochester and Bedford), Ltd., Rochester, Kent.



SHORT and HARLAND

THE Hereford bomber and the Bombay bomber transport are the two types selected for initial production in the Short and Harland works. The Hereford is of Handley Page design and is, in fact, a Hampden with Napier Dagger 24-cylinder H-shaped engines.

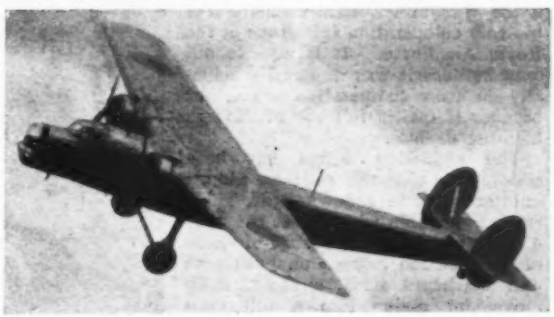
The Bombay is of Bristol design and is fitted with two Bristol Pegasus XXII engines. It was designed for troop carrying, bombing or transporting spare engines and provisions and is arranged as a high-wing monoplane.

The armament comprises four machine guns, one being fitted in each of the hydraulically operated gun-turrets in the nose and tail and one firing through each side of the rear fuselage.

The span is 95ft. 9in.; the length, 69ft. 3in.; and the wing area, 1,340 sq. ft. At an all-up weight of 20,000 lb. the top speed is 186 m.p.h.

Short and Harland, Ltd., Queen's Island, Belfast.

Two 24-cylinder Napier Dagger H-shaped air-cooled engines power the Hereford bomber (above) as built in the Short and Harland works. Below is the Bristol Bombay bomber transport which is built at the same factory.



VICKERS ARMSTRONGS

THE Supermarine works of the Vickers Armstrongs group are engaged in the large-scale production of one of the most interesting and formidable fighters ever designed. This is the Spitfire single-seater, eight-gun fighter which is used by many squadrons of the Royal Air Force.

The Spitfire's wing is of light-alloy construction and has a single spar comprising tubular flanges and a plate web. Forward of the spar the wing is covered with heavy-gauge light-alloy sheet which forms with the spar web a stiff, strong torsion box. The fuselage is in three parts, the rear portions being of monocoque construction and the front section of tubular construction. The undercarriage retracts in an outward direction and split trailing-edge flaps are fitted.

The engine is a Rolls-Royce Merlin II or III driving a three-bladed variable-pitch or constant-speed airscrew.

The eight machine guns are mounted four in each wing

The Supermarine Spitfire above is an eight-gun fighter capable of 367 m.p.h. It is seen approaching to land.

The Vickers Wellington I bomber (below) does 265 m.p.h. with two Bristol Pegasus XVIII engines.

On the left is an experimental Wellington with Bristol Hercules sleeve-valve engines. The biplane above is the Supermarine Walrus, an amphibian which is operated from the catapults of warships.

and full day and night fighting equipment is carried.

A top speed of 367 m.p.h. is attainable at 18,400ft. and the time of climb to 11,000ft. is 4.8 min.

The Vickers Wellington twin-engined, long-range bomber is being produced in large numbers at the Vickers works. This machine is of geodetic construction and has fabric covering. With two Bristol Pegasus XVIII engines a top speed of 265 m.p.h. is attainable at 17,000ft. Other products of the Vickers Armstrongs group in service with the R.A.F. are the Supermarine Stranraer twin-engined biplane flying boat and the Walrus three-seater amphibian.

Vickers Armstrongs, Ltd., Vickers House, Broadway, Westminster.

WESTLAND

ONE of the most interesting military aircraft produced in recent years is the Westland Lysander as supplied to army co-operation squadrons of the Royal Air Force. It is notable not only because it was designed specifically for army co-operative duties, but because it makes full use of modern high-lift devices.

The high-wing design has been adopted to give the pilot an almost uninterrupted view downwards. There is a roomy cabin which gives the pilot a direct and immediate range of vision of at least 160 degrees on both port and starboard sides, a slight body movement giving him a full view through all points of the compass.

The undercarriage is interesting in that it is a cantilever structure shaped like an inverted U. Attachments are provided for stub wings which carry bomb racks, supply containers with parachutes, parachute flares or extra fuel tanks. Two fixed guns are enclosed within the wheel fairings, and there is a free gun in the rear cockpit.

The Westland Lysander II, an extremely efficient army co-operation machine, fully slotted and flapped and fitted with a Bristol Hercules sleeve-valve engine.

Handley Page slots and slotted flaps give full control at speeds just above the stalling point, which is in the region of 50 m.p.h.

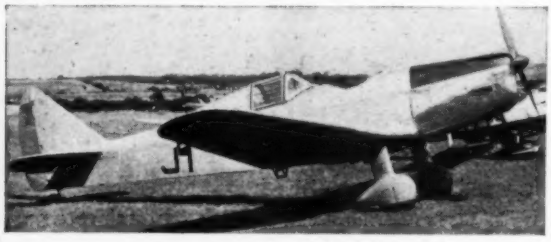
Machines of the first batches were powered with the Bristol Mercury XII radial, but the newer series have the Bristol Perseus XII engine.

The Lysander can attain a height of 50ft. from the start of take-off in 245 yards.

Westland Aircraft, Ltd., Yeovil, Somerset.

PARNALL

THE Parnall 382 monoplane trainer is now undergoing development, but the following description, in the main, will still apply. The machine is a low-wing monoplane with fixed undercarriage, and is equipped with Handley Page slots and slotted flaps. Construction is all wood with ply-covering for the wings and fuselage, and the machine can be built with open cockpits or with a sliding hood over the rear seat which accommodates the instructor.



A new training aircraft which has acquitted itself well in trials is this attractive Parnall monoplane. The engine is a D.H. Gipsy Six. In the version shown the rear cockpit is enclosed.

The standard power plant is the D.H. Gipsy Six Series II which drives a fixed-pitch airscrew and gives a top speed of 155 m.p.h. The take-off run with full load in a 5 m.p.h. wind is 180 yards.

Demonstrations have shown that the machine is extremely manœuvrable, and that, while the slots and flaps give it very good stalling characteristics, the spin and recovery are normal.

The span is 33ft. 8in., and the length 28ft. 9½in. Empty the machine weighs 1,665 lb., the all-up weight being 2,450 lb.

By using the slots and flaps the 382 can be flown at 43 m.p.h. with the engine off. The stall is not reached until the angle of incidence is over 30 deg., eliminating the possibility of accidental stalling on the glide.

Parnall Aircraft, Ltd., Yate Aerodrome, near Bristol.

BRITAIN'S CIVIL AIRCRAFT

ARMSTRONG WHITWORTH

RE-RATED Amstrong Siddeley Tiger IX engines give the big Armstrong Whitworth Ensign a performance which, considering the date of the design, must be considered very creditable, the top speed being 205 m.p.h. and the cruising speed 170 m.p.h. The machine is an all-metal four-engined high-wing monoplane originally designed to carry forty passengers for European operations or twenty-seven passengers by day and twenty by night on the over-land Empire services.

The wing is of the single-spar type and the fuselage is a monocoque structure. The undercarriage, which retracts into the inboard engine nacelles, is probably the biggest of its kind in the world.

Sir W. G. Armstrong Whitworth Aircraft, Ltd., Whitley, Coventry.

CHILTON

AN attractive side-by-side two-seater trainer or private-owner type is now under construction at the Chilton factory. With Gipsy or Cirrus Minor engine it will weigh about 1,350lb. all-up and will have a top speed of 130 m.p.h., the landing speed with flaps being 37 m.p.h.

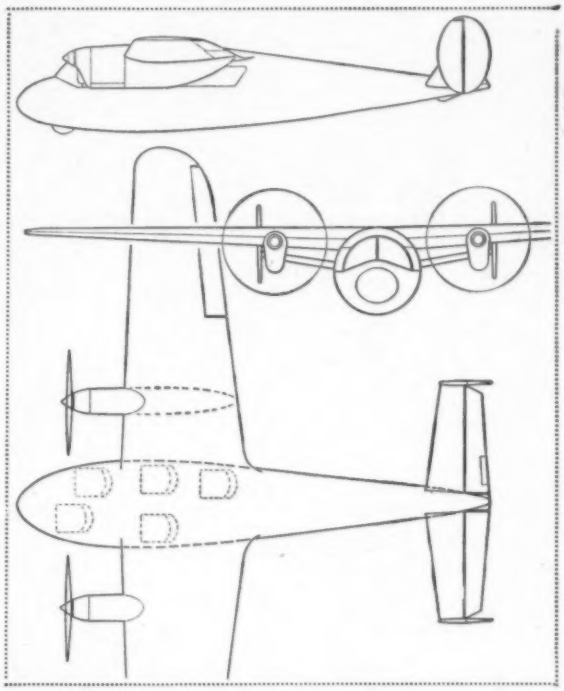
Before the war negotiations were in progress for building a small batch of twin-engined machines with a loaded weight of about 2,800lb. at a top speed of 160 m.p.h. with Gipsy or Cirrus Minor engines. The machines were to have a retractable tricycle undercarriage, flaps, and Chilton slots.

Chilton Aircraft, Hungerford, Berks.

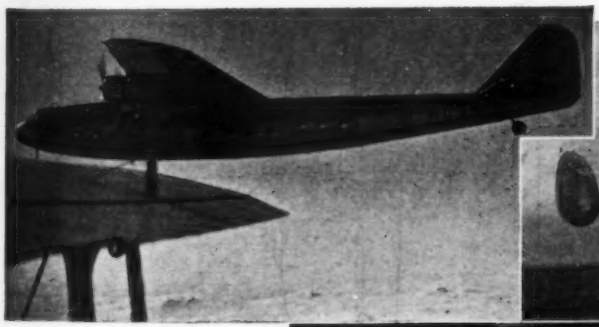
CHRISLEA

THE Chrislea light monoplane is a side-by-side two-seater which, with a Walter Mikron engine, has a top speed of 118 m.p.h., a cruising speed of 105 m.p.h. and a range of 350 miles.

Chrislea Aircraft, Ltd., Heston Airport, Middx.



General arrangement of the Chilton Twin which, with two 90 h.p. engines, would have a top speed of 160 m.p.h. It is a four/five seater with a retractable tricycle undercarriage.



"Flight" photograph

The Armstrong Whitworth Ensign (top left) is one of the largest transport land planes now flying, having a span of 123 ft. and a loaded weight of 46,500 lb.

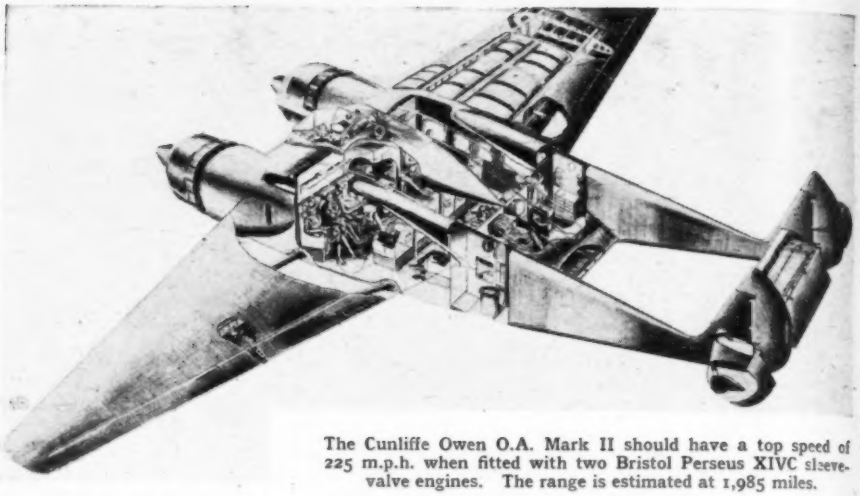
"Flight" photograph.

With two Bristol Perseus sleeve-valve engines the De Havilland Flamingo (top right) has a maximum continuous cruising speed of 220 m.p.h. flying at a weight of 17,000 lb.

Golden Hind, first of the Short 'G' class flying boats fitted with four Bristol Hercules sleeve-valve engines.

CUNLIFFE OWEN

CUNLIFFE OWEN AIRCRAFT, Ltd are continuing to develop high-wing monoplanes of the "Flying Wing" type with a fuselage of aerofoil section and of simple construction as exemplified in the prototype, which has been flying for some time. The prototype development, known as the O.A. Mark II, is the subject of our illustration. The wings are of the two spar type, the spars consisting of T section dural extrusions for the booms, sheet webs and vertical stiffeners. The centre wing, or fuselage, has a maximum depth of 6ft. and is 15ft. 6in. wide. Twenty passengers can be accommodated. The tail booms are wide and deep enough at the roots to house a lavatory in one and a pantry in the other. The undercarriage is retracted hydraulically into the nacelles behind the two Bristol Perseus XIVC sleeve-valve engines. A crew of four is provided for.



The Cunliffe Owen O.A. Mark II should have a top speed of 225 m.p.h. when fitted with two Bristol Perseus XIVC sleeve-valve engines. The range is estimated at 1,985 miles.

Data are: Span, 72ft.; length, 45ft. 2in.; total lifting area, 890 sq. ft.; all-up weight, 19,000lb.; payload for maximum range, 2,820lb.; wing loading, 21.4lb./sq. ft.; top speed, 225 m.p.h.; economical cruising speed 185 m.p.h.; service ceiling, 20,000ft.; and range in still air, 1,985 miles.

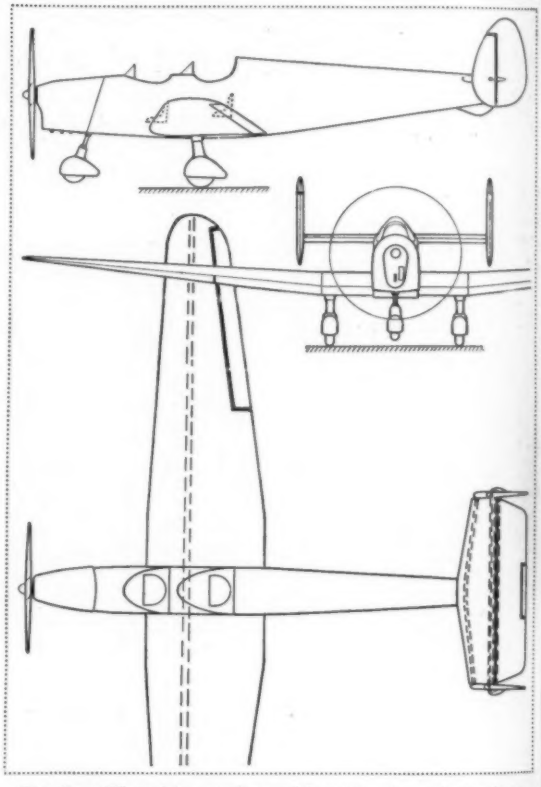
Cunliffe Owen Aircraft, Ltd., The Airport, Southampton.

DART

THE Weasel trainer, as developed by Dart Aircraft, Ltd., is a wooden two-seater low-wing monoplane with a tricycle undercarriage, split flaps and double fins and rudders. The pupil is placed in front of the instructor and the view from both cockpits is good. The wing is of the single-spar variety with a plywood-covered leading edge to take torsional stresses. A Cirrus Minor, or an engine of corresponding power, is specified.

The company has also designed the Silver Dart advanced trainer, a low wing monoplane with an Alvis Leonides engine or any other radial of up to 700 h.p. Slots and slotted flaps are fitted and the undercarriage retracts inwards, though a fixed cantilever gear can be installed.

Dart Aircraft, Ltd., 2, High Street North, Dunstable, Beds.



The Dart Weasel is a trainer with a tricycle undercarriage, split flaps and twin fins and rudders.

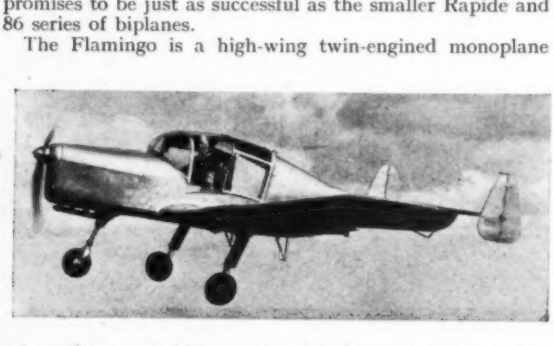
DE HAVILLAND

BEFORE the war the De Havilland Company was in production with the attractive and highly promising Moth Minor light tandem two-seater. "Civil" interest, however, now centres on the Flamingo transport, which promises to be just as successful as the smaller Rapide and 86 series of biplanes.

The Flamingo is a high-wing twin-engined monoplane and may be regarded as the country's first all-metal medium-capacity transport. The two Bristol Perseus XIIC give a sufficient reserve of take-off power for the machine to fly and climb on one engine up to 8,000ft. with full load.

The span is 70ft.; the length 51ft. 10in. and the wing area 651 sq. ft. A continuous cruising speed of 210 m.p.h. can be maintained and the top speed is 234 m.p.h. The climb to 10,000ft. takes only 10.1 min.

The De Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts.



One of the most efficient and practical light aircraft in the world—the G.A. Cygnet.

GENERAL AIRCRAFT

SINCE our last "Industry" number the development of the G.A. Cygnet (still Britain's only all-metal light aircraft) has been completed. The Cygnet is a low-wing

cantilever monoplane with an all-metal part-monocoque fuselage. A tricycle undercarriage and twin fins and rudders give great stability and ease of handling on the ground and in the air. Equipment includes split flaps and a special combined safety ignition switch and petrol cock. The cabin is covered by divided sliding hoods and seats two people side-by-side. A Gipsy Major or a Cirrus Major engine may be fitted.

Data (with Cirrus Major engine) are: Top speed, 135 m.p.h.; cruising speed, 115 m.p.h.; landing range, 60-85 m.p.h.; service ceiling 14,000ft. and cruising speed 445 miles. The span is 34ft. 3½in. and the all-up weight 2,200lb.

MARENDAZ

IN *Flight* of November 23 details were given of a new Marendaz trainer. This is a tandem two-seater low-wing monoplane of more or less conventional appearance, though some details are interesting, as, for example, the undercarriage, the wheels of which roll sideways during a landing.

With a Cirrus Minor engine the top speed is about 124 m.p.h and the landing speed 40 m.p.h.

In addition to this type there is the Marendaz Mark III cabin monoplane trainer which has a retractable undercarriage, side-by-side seating, spectacle controls, flaps and a Gipsy Six engine which is claimed to give a speed in the region of 200 m.p.h.

Marendaz Aircraft, Barton Airport, Beds.

MAYO

THE Mayo Composite aircraft is very far from being dead, though unfortunately it is not permissible to discuss developments. Obviously, the Mayo system of assisted take-off has great military as well as commercial possibilities, the latter already having been proved by the achievements of the prototype "Compo."

The Mayo Composite Aircraft Co., Ltd., 55-58, Pall Mall, London, S.W.1.

The attractive little Mosscraft monoplane with Cirrus Minor engine.

MOSSCRAFT

THE Mosscraft low-wing monoplane trainer was the first of the machines in which the pilot was seated in front. Production of the type is at present being confined to a batch laid down before the war. These machines are powered with the Cirrus Minor engine and have the following characteristics: Span, 34ft.; length, 23ft. 3in.; all-up weight, 1,400 lb.; maximum speed, 120 m.p.h.; cruising speed, 105 m.p.h.; stalling speed (flaps down), 36 m.p.h.; initial rate of climb, 850ft./min.; range, 350 miles.

Moss Brothers Aircraft, Ltd., Chorley, Lancs.

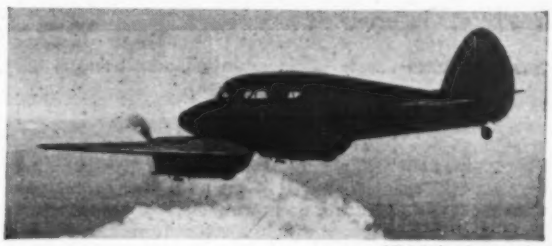
PERCIVAL

THE largest of the Percival series is the Q6, a six/seven-seater cabin monoplane with two D.H. Gipsy Six Series II engines. A fixed or retractable undercarriage can be fitted, data for the version with the retractable gear being: Top speed at sea-level, 195 m.p.h.; cruising speed at 7,000ft., 181 m.p.h.; take-off run, 200 yards, and range, 700 miles.

The Percival Vega Gull is a four-seater low-wing cabin monoplane with a single Gipsy Six engine. Like the Q6 it has efficient trailing edge flaps; these reduce the landing speed to 44 m.p.h. When the Series II version of the Gipsy Six is fitted, the machine has a top speed of 174 m.p.h. and will cruise at 170 m.p.h. at 7,000ft. The range with standard tankage is 600 miles.

The Mew Gull is a high-performance single-seater cabin monoplane suitable for use as a high-speed tourer and a light mail carrier or high-speed trainer. Two versions are made, the type E.3.8 having a top speed of 245 m.p.h. and a rate of climb at sea-level of 1,800ft./min. It carries a payload of 208 lb. for 900 miles.

Percival Aircraft, Ltd., Luton Airport, Beds.



"Flight" photograph.

A Percival Q6 light transport as fitted with a retractable undercarriage. The engines are Series II Gipsy Sixes.

SHORT

ONE of the most successful commercial aircraft ever produced is the Short Empire type of flying boat as built for Imperial Airways. The standard version of this machine weighs 40,500 lb. and has a top speed of 200 m.p.h. Developments of this boat, incorporating aerial refuelling gear, are strengthened for take-off weight of 46,000 lb. and are able to be refuelled up to a total weight of 53,000 lb., thus being easily capable of making trans-atlantic flights. These machines have Bristol Perseus sleeve-valve engines, whereas the original Empire boats had Pegasus.

Later and larger than these machines are the "G" class boats which have four Bristol Hercules IVC engines giving a maximum combined take-off output of 5,520 h.p. The "G" boat measures 134ft. 4in. in span and weighs 73,500 lb., the weight empty (equipped) being 37,700 lb. On 70 per cent. power the cruising speed is 180 m.p.h., the maximum attainable being 209 m.p.h. In general design the machine resembles the earlier Short commercial machines. Apart from the structure the only real change is in the layout of the navigational compartment, which is very much larger and will carry not only a captain, first officer and radio operator, but an engineer, at his own station, and a navigator. This compartment should be of great value on flights of over 3,000 miles which can be easily undertaken by the "G" class boat.

Before the war the company had under construction three large commercial landplanes, with Bristol Hercules engines. One of these was to operate at more or less normal heights and the other was to have a pressure cabin for high-altitude work. At 25,000ft. a cruising speed of 275 m.p.h. was anticipated.

Short Bros. (Rochester and Bedford), Ltd., Rochester, Kent.

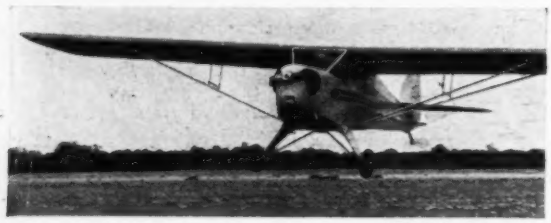
TAYLORCRAFT

THE Taylorcraft Plus high-wing light monoplane is a side-by-side seater cabin machine of all-metal construction, excepting the wing spars. There are two doors and the cabin is soundproofed. Stick control, Girling brakes, and ventilators are now standard on all models. The fuselage is a fabric-covered welded tubular steel structure.

The power plant can be a 55 h.p. Lycoming, a 75 h.p. Lycoming, or a 90 h.p. Cirrus Minor, the top speed with the last-named unit being 110-115 m.p.h. The empty weight of the Cirrus version is 850 lb. and the gross weight

1,400 lb. The landing speed is only 40 m.p.h. and the take-off run is given as 75-95 yards.

Taylorcraft Aeroplanes (England), Ltd., Britannia Works, Thurmaston, Leicester.



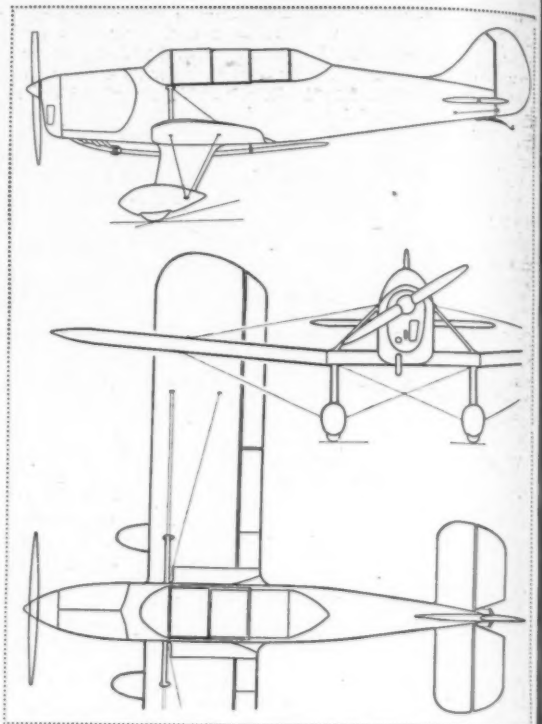
"Flight" photograph.

An Anglicised version of a successful American type, the Taylorcraft Plus.

WICKO

PRODUCTION of the high-wing Wicko has been temporarily suspended, but, owing to the present trend towards low-wing tandem-seat trainers, the manufacturers have evolved a machine which is virtually a low-wing conversion of this type, and which utilises as much as 75 per cent. of the original parts. The new aircraft is known as the Wicko Windsor and will normally be powered with the 130 h.p. Series I Gipsy Major. Owing to the parallel wing form no serious change from the high-wing machine's viceless performance is anticipated. The method of wing-folding is unorthodox, but simple; the flying wires are slackened by means of an eccentric attachment and the quickly detachable pins removed.

Foster, Wikner Aircraft Co., Ltd., Southampton Municipal Airport, Southampton.



The new Wicko Windsor trainer will utilise as much as 75 per cent. of the parts of the high-wing Wicko.

Dublin-Liverpool Air Service

SINCE October 23 there has been a rising demand for accommodation on the Dublin-Liverpool air service, and only rarely has a machine taken off with less than a full complement of passengers. In fact, the total number of passengers carried to date is well over 450, while many potential travellers have been unable to book seats. Up to November 20 the week-day only service, one journey in each direction between Dublin and Liverpool, was made by a D.H. 86. Now there is another similar machine on the service each Monday, Wednesday and Friday until further notice. Both machines depart from Baldonnel Airport at 9.45 a.m., arrive at Speke, Liverpool, at 10.20 a.m. and returning from there at 2 p.m. are due at Baldonnel for 3.20 p.m. Single fare is £4, return fare £6; the latter available for 18 days.

The Merger

THE establishment of the British Overseas Airways Corporation, commonly known as the BOA, was announced by the Air Ministry on November 26. In the interests of economy advantage has been taken of the Chartered and Other Bodies (Temporary Provisions) Act to provide that the corporation may be established with three members only. The following members have been appointed: Sir John Reith (chairman), Mr. Clive Pearson (deputy chairman), and Mr. Leslie Runciman.

Scottish Airways

RECENT changes announced by Scottish Airways, Ltd., include a ten per cent. increase in fares, resumption of the air service between Inverness and Shetland via Wick and Kirkwall, twice a week, and a change of the town terminal at Kirkwall. The Inverness-Shetland service operates once in each direction on Thursdays and Saturdays, in addition to the daily service (Sundays excepted) in each direction between Inverness, Wick and Kirkwall. The new terminal at Kirkwall is at 9, Broad Street.

India Too

A DECISION to give financial assistance to men who are willing to train as pilots and engineers and to serve in the R.A.F. if called upon to do so, has been taken by the Government of India. The intention is to give advanced training to those who are already pilots, and ad initio training to a limited number of applicants.

By Blenheim to Bucharest

ALTHOUGH it has been known for some time, it has only now become possible to publish the fact that during the past few weeks no fewer than 36 Bristol Blenheims have been delivered to Rumania by air. A senior officer of the Rumanian Air Force arrived in this country some weeks ago with twelve pilots to take delivery of the first batch. These were flown to Rumania and the pilots returned for a second, and after that for a third batch of twelve machines. Three Blenheim squadrons will be formed in Rumania with these machines.

The Empire Training Scheme

THE negotiations for the Empire Training Scheme have now been concluded in Canada, and the New Zealand and Australian delegates are on their way home. The delegates had a final meeting with the Prime Minister of Canada, Mr. Mackenzie King, at which the formal agreement was signed.

Exhaust Propulsion

IT is regretted that, owing to the space devoted in this week's issue to the illustrated descriptions of British aircraft, it has been necessary to hold over the third of Dr. Lanchester's articles on Exhaust Efflux Propulsion.

The Lion Has Wings

THE film "The Lion Has Wings" is being generally released this week and is being exhibited at (among other places) the Metropole, Victoria, London, S.W.1. The manager, Mr. R. S. Sowden, took the opportunity of arranging a display of *Flight* photographs at this theatre last week in announcing the film.

The second special issue of

FLIGHT

devoted to the British Aircraft Industry will be published next Thursday, December 7.

The Special contents include a review of ENGINES, COMPONENTS, and MATERIALS.

BEFORE and AFTER

Civil Aviation and the War : The Need for Continued Development : There is Still a Future to be Considered

By H. A. TAYLOR

IT is an unfortunate thing that nothing can ever be started quite where, to use a loose expression, it left off. Before the last war flying was slowly coming into its own; afterwards it went ahead quite rapidly—but not as rapidly as was generally expected, and with the inevitable effects of uneconomic wartime development. It is doubtful, in fact, if aviation ever quite recovered from the war of 1914-1918. Without it, the whole history of aeronautical development might have been very different indeed. Whether for better or worse can never be estimated.

This time conditions are different. Before the present war civil aviation had most certainly "arrived," though the child was still suffering from measles, chicken pox and other little troubles to be expected where the young are concerned. During the previous two decades air transport had never become quite stabilised. After a short initial period of uneconomic competition between companies using unsatisfactory equipment, there came the time of absolute monopoly under the thumb of a somewhat parsimonious Government, followed by a shorter period during which a number of new concerns cropped up—among them a strong and well-ordered company, British Airways, which was at least partially designed to help the national airline company, Imperial Airways, along with intensive and subsidised competition. At the same time the Government had realised the prestige and other importance of this country's civil aviation, and Imperial Airways was given a real chance to compete with the airline companies of other countries.

Reverting to Monopoly

A few months before war broke out the decision to encourage competition was apparently reversed, and plans were laid for the formation of a single company which was, once again, to have a monopoly of air transport. This concern, the British Overseas Airways Corporation, was to be given a chance of showing the world, once and for all, what we could do when we really got down to it.

With the long experience and vast organisation of Imperial Airways, and the particular modernistic virtues of British Airways, a year or eighteen months might have seen some very big things.

Two or three types were in process of development, but the most promising could not be expected to be in service before the end of 1940. In the meantime the gap might or might not have been filled by purchases from America.

Everything now depends on the length of the war. But whatever happens, the needs of civil aviation should not be forgotten. Even for the restricted wartime services, and for the innumerable jobs of work which have to be done, the present combined fleets will eventually prove inadequate, while military types can never be made into satisfactory transports. And after the war—unless it is a war of economic extermination—there will be an immediate demand for fast and up-to-date commercial types. We cannot afford to wait two or more years for the necessary equipment.

Use *can*, of course, be made of certain available military machines, but only for certain purposes. The majority of them, as those who have flown them know, are almost incredibly uncomfortable—a not unnatural fact since the dimensions of the interior are of no account and performance *is*. Some could usefully be applied to the work of mail-carrying, but only one or two to the work of passenger-carrying, and that after considerable and expensive modifications. Surely we do not wish to return to the years immediately following the last war, when passengers sat, in frightened discomfort, in the miserable interiors of other converted military types. The present machines, though immeasurably faster and more efficient, are no more suitable.

Keeping Up to Date

Nothing, I am afraid, will be learnt during the war which will be of value or use to the designers of civil machines. They will need to start where they left off, and how much better it would be if they had not found it necessary to leave off. Some weeks ago, in an editorial, *Flight* suggested that a certain number of experienced designers and engineers should be sent to America or Canada in order to watch developments in the U.S. and to act as what are now known as "project engineers." There might be no need, perhaps, to build actual machines, it would be sufficient to follow, improve, design and redesign up to a moment when the end of the war was very obviously in sight. The construction of that old-fashioned device, a prototype, could then be proceeded with in readiness for full production in quantity.

This material must obviously be used, and here is the logical and practical method of using it. While a flourishing aircraft works cannot be turned into a particularly satisfactory chewing-gum factory, it *can* be turned (at considerable expense, but no great loss of time) into a commercial aircraft factory.

Financial Assistance

It seems to me that the post-war years will demand very generous and energetic planning if the democratic powers are to survive them without hardship. I am no economist, but it might conceivably pay in the end to continue to spend a fair proportion of the present-day outlay in this and similar projects. We could then obtain a greater proportion of the world's aircraft market. Once obtained, it can more easily be held and even extended.

Obviously, we must know exactly what we want to build—and thus to be able to start work immediately after the war. It will be no use saying, "Well—er . . ." when our friends in the U.S. have *x* years of clear progress ahead of us. We must advance at the same rate and be absolutely ready to go into production with a first-class series of types within a few months of the end of the war.

Although the purpose for which the C.A.G. was formed should no longer be apparent and, in fact, even the old club subsidy may be difficult to justify, there will be more pilots than ever before ready to buy or to make good use of aeroplanes in normal life. Here again, however, some sort of subsidy (possibly of private ownership) might be considered worth while in order to help a section of the aircraft industry and to prevent it from collapsing like a pricked balloon. Again, the payment would only be temporary, since, once a sufficient number of purchasers have been encouraged, it should be possible to produce really first-class machines at a comparatively low price.

At the end of the peace there were far too many types—most of them much too expensive—and no market of which to speak. That difficulty will have been automatically cleared up and the industry will be able to start with a clean slate.

All of which is presupposing a reasonably short war. All of us will need to think again even if it continues for the "at least three years" envisaged by the authorities. In that case, flying may become too much of a luxury for anyone but the State—which, luckily for the industry, must still run airlines. The important future of flying lies in the really vigorous development of safe and fast airlines, and that future will always remain with us. So far we have hardly touched the edge of the possibilities.

WAR in the AIR

A Weekly Summary of Air Action : The Luftwaffe Over the British Isles and Over the Western Front

The Heinkel He 111 K bomber is being employed extensively for strategical reconnaissance. One of these machines, which are supposed to do something like 270 m.p.h., is seen through the front gunner's position of a similar aircraft.

THE last week has been remarkable for increased air activity both round British coasts and on the front in France. Reconnaissance machines have been appearing at various points up and down the East Coast of Britain, but only on the Shetlands have bombs been dropped. The Shetlands seem to have a great fascination for German bombers. On one Shetland visit they did get some luck, for the first time. On Wednesday, November 22, they set fire to a flying boat of the R.A.F. which was lying at its moorings. The crew escaped without suffering any harm.

The Magnetic Mines

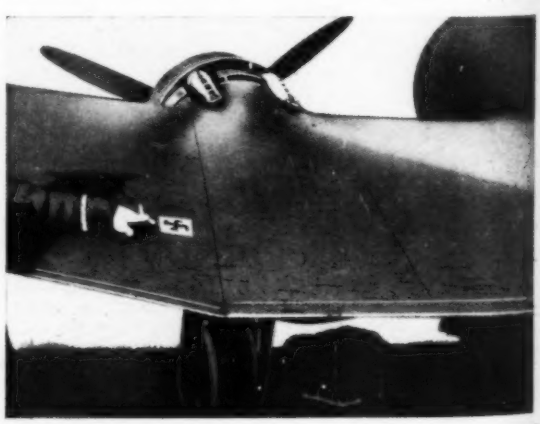
A NEW development has been the dropping of mines from German aircraft round about the Thames estuary.

Magnetic mines are not a new invention, but they have not been used in war before. Needless to say, the laying of any mines in a shipping channel without notification is a breach of an international agreement which Germany has signed. Most of the mines are laid by submarines, but some have been dropped by parachute from aircraft. This operation has to be carried out at dusk and from a fairly low height, as it is essential that the mines should be laid in the proper channel and not dropped broadcast over sea or land. Those dropped in this way cannot be so numerous as those laid by a submarine, as the latter is not subject to the same limitations.

The reconnoitring machines which have been approaching the coast and sometimes even venturing to cross it have evidently been taking photographs, and when the visits have been by night they must have tried to discover the effectiveness of the British black-out. As was recorded in our last week's issue, one German machine actually got over to the west of England, and was driven off towards the Irish Sea. But this temerity was exceptional. Most of the visitants simply approach the East Coast, and when they perceive (through the bursting of nasty big shells in their neighbourhood) that they have been spotted, they turn tail and make off while the going is still good. Their pilots evidently have a great respect for our Hurricanes and Spitfires, and small blame to them. A reconnaissance aeroplane can neither defend itself from fighter attack nor escape from one if the latter has got within sight of it. So they usually take time by the forelock and waste none before altering course 180 degrees.

As briefly mentioned in our last issue, on Tuesday, November 21, a blue and grey Dornier 17 left this manœuvre a little too late. It was flying high over Deal when it was sighted by three patrolling British fighters who immediately gave battle. As the fighters came up in formation to attack, the Dornier dived. The fighters broke formation and each fired bursts. Black smoke poured from the German aircraft as it went into a spin and finally plunged into the sea. There had been no anti-aircraft fire to warn the German pilot of his impending doom, and, incidentally, no air-raid warning had been given.

It will be remembered that on Monday, November 20, some of our fighters had attacked another German machine off the East Coast and our pilots thought they saw a piece



When French machines come home with German oullet holes in them small swastikas are sometimes applied to the points of entry. Here is a Potez 63 after treatment.

WAR IN THE AIR (CONTINUED)

of the enemy's port wing shot away before the machine disappeared into the clouds. As the opinion was not definite, no claim was made at the time that this machine (a Heinkel III) had been destroyed, but next day the crew of three were found adrift in a collapsible boat. They were picked up by a British ship and landed at an East Coast port.

There would be little profit in recording each instance of a German reconnaissance machine appearing off our East coast. Warnings are not sounded unless there is thought to be real danger of some town being bombed, and this is seldom the case. In most cases our anti-aircraft guns have fired at the scout and usually that has been enough to turn it back. Whenever possible our fighters go up and endeavour to engage it, but as a general rule the German has made off before an interception was possible.

Increased Air Activity

OVER the lines on the Franco-German frontier, the weather has lately improved and there has been increased activity. The results have been anything but encouraging for the Germans. On Tuesday, November 21, the French brought down one German reconnaissance machine in their own lines and sent two fighters down in flames behind the German lines. Next day, Wednesday, November 22, the Allies between them got down six German machines. The French fighters, and in particular the Curtisses, were the most successful. French A.A. guns also got down one Messerschmitt 109, and a Hurricane disposed of a Heinkel III which went down on the other side of the Belgian frontier. A report from Brussels says that two of the crew of this Heinkel were killed in the fighting, while a third man took to his parachute and was made prisoner by the Belgians. The machine crashed near Thourout, not far from Bruges. Of the machines which came down in France, three German pilots descended in parachutes and were made prisoners by the French. Thursday, November 23, was almost as good a day, as seven German machines were shot down, and this time it was the R.A.F. which had all the luck. The Air Ministry statement about the day's fighting is as follows:

"Six were shot down on the Allied side of the lines and one on the enemy side. The enemy aircraft were carrying out individual reconnaissances at heights of about 2,000ft. or more. They were four Dornier 17 aircraft; two Heinkel III bombers; and one aircraft of a type not ascertained. All four Dorniers came down in French territory. One of these, which has been inspected, was found to be carrying cameras. During one engagement two members of an enemy aircraft crew landed by parachute. There were no casualties among R.A.F. personnel, but one of our aircraft was hit by enemy machine gun-fire and had to land. The tail of another was damaged, but the pilot succeeded in bringing his aircraft to his aerodrome."

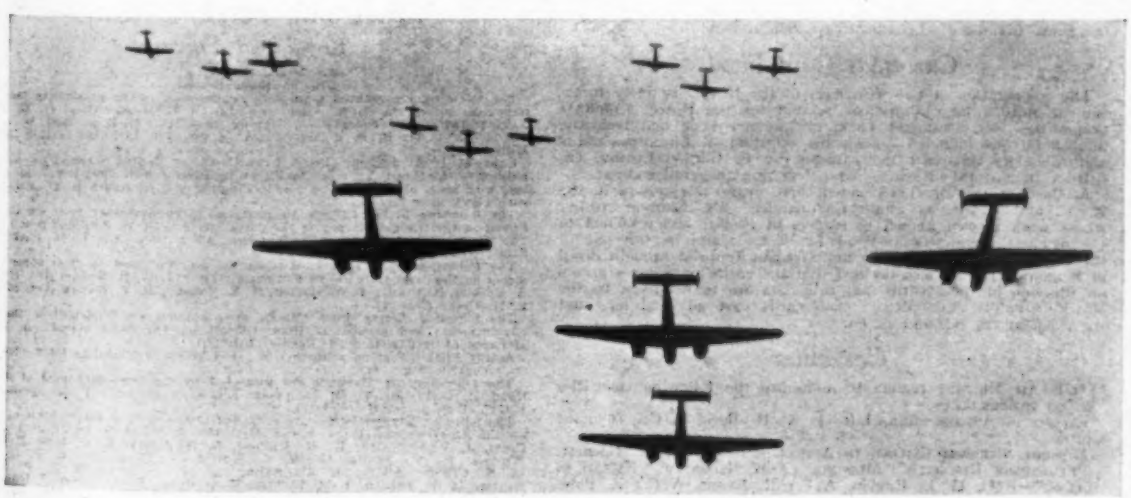
The unidentified machine was afterwards found to be another Do.17. The French also brought down two enemy aircraft that day, thus making a total of nineteen destroyed in 48 hours.

Of course, the loss of nineteen machines on the front in three days and a few more reconnaissance machines over the North Sea makes no real difference to the strength of the *Luftwaffe*. Nevertheless, as an old saying goes, "straws show which way the wind is blowing," and the continued success of both French and British fighters at trifling loss to themselves is certainly suggestive. At least we may assume that a succession of losses, even though small in number, can hardly have an exhilarating effect on the spirits of the whole body of German airmen.

RADIO-CONTROLLED TARGET

IN the United States the Army Air Corps has done a series of tests at Wright Field, Dayton, Ohio, on a radio-controlled model aeroplane for use as a flying target. The model has a 12ft. wing span and, as it is about one-third the size of a fighter and simulates to some extent the movements of a real military aircraft, it is a useful target. Its service ceiling is limited to 5,000ft. and it flies at a modest speed. A single petrol engine drives two tractor airscrews to keep the model in flight, but for take-off it is launched by a catapult and is brought to a safe landing on its tricycle undercarriage by means of a small parachute. Being small, it can easily be carried on the roof of a car—but the catapult would not be so mobile.

For take-off, the model is placed on the catapult and the engine started and adjusted to take-off revolutions. Release of the catapult shoots the model into the air and it continues its flight under its own power. It is manœuvred by the officer on the ground by means of a small instrument like a telephone dial held in the hand. When gunfire ceases, it is directed over a landing area by radio control and then, also by radio control, the engine is stopped and the parachute is opened. With the aid of the parachute no doubt a three-point landing could be expected every time.



Though the Messerschmitt Me 110 was used in Poland, information on the type is very scarce. Here are some of these fast twin-engined fighters beneath a formation of Me 109s.

SERVICE AVIATION

Royal Air Force and Official Announcements

ABOARD ARK ROYAL: A photograph of the new Chief of Naval Air Services, Vice-Admiral Guy C. C. Royle, taken when he flew his flag as Vice-Admiral Commanding Aircraft Carriers. He has now been appointed Fifth Sea Lord in succession to Vice-Admiral the Hon. Sir Alexander Ramsay.

Mr. Chamberlain and the R.A.F.

ON Saturday of last week the Prime Minister and Mrs. Chamberlain visited the Fighter Command of the Royal Air Force. They were received by Air Chief Marshal Sir Hugh Dowding, the Air Officer Commanding-in-Chief, Fighter Command. The Parliamentary private secretary of the Secretary of State for Air, Sir Edward Campbell, accompanied them

Truant Balloons

THE Air Ministry has announced some official advice for any members of the public who may see a barrage balloon grounded. If the balloon is near at hand the police should be informed as accurately as possible of the location. But distant observers of balloon grounding should not telephone the police unless it seems likely that no other person has noticed the occurrence and already communicated with the police. Also, a warning is given that it is dangerous to touch the balloon or its cables, and that smoking is dangerous because of the risk of explosion and fire.

Christmas Card Fund

The co-operation of two ex-officers of the R.A.F. is likely to result in quite a large Christmas present for the R.A.F. Comforts Committee. Mr. Desmond Tuck, of Raphael Tuck and Son, the publishers, has included among his selection of Christmas cards and calendars this year the painting by F. Gordon Crosby, entitled "In a world of space" and depicting an aerial combat.

In the last war Mr. Tuck ended three years' war service in the R.F.C. and R.A.F. as Flight Commander. Mr. Gordon Crosby, whose work is well known to readers of *Flight*, was attached to the technical intelligence side of the R.A.F., and he was one of the experts who examined the first German Zeppelin brought down in Belgium. It has been decided that the entire publisher's profits on the sale of these cards and calendars are to be given to the R.A.F. Comforts Committee. The cards cost 3d. and 6d., and the calendars 1s. 6d. and 2s. 6d.

Casualties

THE Air Ministry regrets to announce the following casualties on various dates:—

KILLED IN ACTION.—Sqn. Ldr. J. A. B. Begg, A/C.1 H. Laybourne.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. G. W. Garnett.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "KILLED IN ACTION."—F/O. H. L. Emden, A/C.1 R. Evans, A/C.2 E. Pateman, A/C.1 G. Sheffield, P/O. K. G. S. Thompson, Flt. Sgt. S. Williams.

PREVIOUSLY REPORTED "MISSING, BELIEVED KILLED," NOW REPORTED "KILLED IN ACTION."—Sgt. D. E. Jarvis.

KILLED ON ACTIVE SERVICE.—Sqn. Ldr. M. A. Aylmer, P/O. I. St. J. Beere, Flt. Sgt. G. A. Brett, Sgt. C. A. Bryant, A/C.1 J. F. Burge, A/C.2 W. J. Chapman, A/C.1 S. C. Colbridge, A.C.1 B. Connet, P/O. R. E. Cox, P/O. M. V. Dugdale, A/C.2 W. H. Dye, Flt. Lt. K. N. M. Eyres, L.A/C. D. George, Flt. Sgt. F. J. B. Moore, F/O. H. E. H. Overall, A.Sgt. R. C. L. Pike, P/O. A. H. J. Ryan, P/O. M. E. R. Smith, Cpl. C. M. Thorpe.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. W. Shaw.

MISSING.—A/C.1 J. S. Burrows, Sgt. F. W. Doodey, A/C.1 J. A. Garrick, Temp. Cpl. D. D. Kane, A/C.1 J. C. Lewis, P/O. B. A. Martyr, A/C.1 A. B. MacDonald, Sgt. S. R. Mitchell, P/O. A. D. Morton.

DIED ON ACTIVE SERVICE.—Acting Cpl. C. F. W. Fisher, A/C.1 T. Gee, A/C.2 W. W. Hutt, Apce. Clerk E. A. Kendall, Sgt. H. Lacey, A/C.1 F. D. Linaker, L.A/C. G. G. J. Lovegrove.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "PRISONER OF WAR.—A/C.1 H. Liggett

Royal Air Force Gazette

Royal Air Force

Air Ministry, Nov. 21.
General Duties Branch.

The following are granted permanent commissions in the substantive rank indicated and on the dates stated:—Flt. Lts. R. G. Musson (Nov. 7); W. S. Gardner (Nov. 13). F/Os. P. A. Tipping (Sept. 16); G. L. B. Hull, W. M. Penman (Oct. 7); R. D. B. MacFadden (Acting Flt. Lt.) (Oct. 23); F. M. Milligan (Nov. 6).

Capt. C. I. A. Jackson (Royal Tank Corps) is granted a temporary commission in the Royal Air Force as Flight Lieutenant with effect from Sept. 12 and with seny. of Sept. 5, 1937, and relinquishes it on return to Army duty with effect from Nov. 5.

The following Flying Officers on probation (Supplementary List) are confirmed in their appointments on the dates stated:—M. V. Whitfield (Sec. Lt. The Queen's Own Cameron Highlanders, S.R.) (Oct. 9); J. O. Fischer-Sobell (Oct. 20).

The following Pilot Officers on probation are confirmed in their appointments on the dates stated:—P. F. Eames (May 31); W. R. Watson (Oct. 12); A. Barkley (Oct. 29); J. W. Garton, G. L. Norman, R. V. Warren (Oct. 30); L. H. Carey (Nov. 1).

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—A. D. McLaren (July 22); C. S. S. Rendle (July 25).

Acting Pilot Officer on probation W. C. Timoney is graded as Pilot Officer on probation (Sept. 5).

The following Air Marshals are promoted to the temporary rank of Air Chief Marshal:—Sir A. M. Longmore, K.C.B., D.S.O.; Sir F. W. Bowhill, K.C.B., C.M.G., D.S.O. (Nov. 1).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—C. G. Isacke (Sept. 15); L. A. G. S. Lewer, J. J. E. Coats, J. V. Hoggarth, W. E. Mulford, D. B. Sellick, R. C. Love, E. L. Wurtele, F. A. Marlow, G. W. C. Watson, J. C. Halley, R. B. Cox, D. E. Gillam, A.F.C., R. C. Ayling, M. V. Peters-Smith, E. P. W. Hutton, M. R. Baillon, T. M. Lockyer, H. D. Jones, E. G. Rogers, J. Greenhalgh, D. M. Barrett, F. B. McAllister (Nov. 16); H. W. Bolingbroke, D.F.C. (Nov. 20).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—R. A. Barnwell (April 30) (seny. of Jan. 30); F. Austin (Nov. 1); L. A. G. Howard (Nov. 3); D. S. Hill, H. R. Benby

J. I. Kilmartin, J. H. C. Speirs, R. C. Bisset, C. S. Harley, L. H. Leader, E. W. Bundock, P. H. Lee, G. G. Avis, G. E. Walker (Nov. 5); C. G. Fisher, L. C. Bartram (Nov. 6); R. F. Rimmer, J. H. Read (Nov. 8); P. B. Sentance, G. B. Walford, I. G. Richmond, R. J. Walker, R. E. Craven, F. C. Rose, J. M. Littler, D. Bamford (Nov. 10); J. F. Mackie (Nov 11); M. F. Briden, J. F. J. Haworth, R. P. Potgieter (Nov. 15); A. E. Brian, D. C. E. Bailey (Nov. 18).

F/O. J. R. Wilson is granted the acting rank of Flight Lieutenant from Aug. 16 to Oct. 3 inclusive.

The following Flying Officers (acting Flight Lieutenants) are seconded for special duty on the dates stated:—H. D. Jones (Aug. 3); V. A. Pope (Oct. 4).

F/O. J. R. Wilson is seconded for special duty for the period Aug. 16 to Oct. 3 inclusive.

The short service commission of the following Acting Pilot Officers on probation are terminated on cessation of duty on the dates stated:—R. J. Gillespie (Nov. 14); K. D. W. Ritson (Nov. 20).

Equipment Branch.

Pilot Officer on probation J. H. Sullivan is confirmed in his appointment (Sept. 12).

The short service commissions of the following Acting Pilot Officers on probation are terminated on cessation of duty on the dates stated:—J. B. Robertson (Nov. 11); C. St. C. R. Chute (Nov. 14).

Commissioned Engineer Officers.

The following Warrant Officers are granted permanent commissions as Flying Officers on probation with effect from the dates stated and with seny. of June 12:—A. W. Green (Aug 26); G. E. Basham (Aug. 30); L. P. O'Connor (Aug. 31); H. G. Blake (Sept. 11); E. J. Gribben (Oct. 12); A. S. Summers (Oct. 28).

Commissioned Signals Officers.

The following Warrant Officers are granted permanent commissions as Flying Officers on probation with effect from the dates stated and with seny. of June 12:—R. W. Williams (Oct. 3); P. F. Overton (Oct. 23); G. A. Cardwell (Nov. 7).

Memorandum.

The permission granted to G. H. Pittam to retain the rank of Second Lieutenant is withdrawn on enlistment into the Auxiliary Air Force (Oct. 20, 1938).

Princess Mary's Royal Air Force Nursing Service

The following Staff Nurses are promoted to the rank of Sister on the dates stated:—Miss C. J. Bolton (Oct. 24); Miss E. N. Stooks (Oct. 28); Miss N. E. Cozens, Miss J. M. Maffey, Miss B. M. Olver (Nov. 1); Miss J. L. Campbell (Nov. 3); Miss K. W. Cranston (Nov. 5); Miss F. Short (Nov. 7).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch.

The following are granted commissions in class CC as Flight Lieutenants on the dates stated:—(April 1):—Sec. Lt. W. P. Lewis. (May 24:—Com. Tel. F. J. Andrews, M.S.M. (R.N. Ret.). (Aug. 12):—Capt. P. A. Moodie.

The following relinquish their commissions in class CC on appointment as commissions in the Royal Air Force Volunteer Reserve (Sept. 1):—Sqn. Ldr. G. J. B. E. Massy, M.C. Flight Lieutenants.—R. E. Lewis, D. M. Greene, G. S. Jarman, A. G. Adams, R. Wilson, G. L. Shipton, K. S. Grove, L. H. Cooper, W. E. D. Campbell, T. R. Wells, M.C., E. W. Reynolds, F. M. Rooth, J. V. Roberts, W. Halford, D.F.C., E. Drudge, M.B.E. (Flt. Lt., R.A.F., Ret.), H. J. Wykes. F/O. E. J. Dilnutt.

Flt. Lt. M. C. Brotherton relinquishes his commission in class CC on cessation of duty (Oct. 20); Flt. Lt. G. L. Torrens, D.S.O., relinquishes his commission on cessation of duty (Sept. 1); Flt. Lt. S. Symonds relinquishes his commission on completion of service and is permitted to retain his rank (Oct. 24); Flt. Lt. H. G. Hamilton relinquishes his commission on account of ill-health and is permitted to retain his rank (Nov. 22).

The following Flying Officers relinquish their commissions on appointment to commissions in the Royal Air Force Volunteer Reserve (Oct. 31):—D. Dewar, A. L. Maidens, P. J. Meade.

Medical Branch

The following Flying Officers are promoted to the rank of Flight Lieutenants on the dates stated:—A. R. Sibbald, M.B., Ch.B. (Sept. 23) (seniority Sept. 7); E. A. Mayston, M.R.C.S., L.R.C.P. (Sept. 23).

Miscellaneous.

W. H. Calvert is appointed Assistant Provost Marshal and is granted a commission in class CC as Flight Lieutenant (July 17).

Royal Air Force Volunteer Reserve

GENERAL DUTIES BRANCH

A. J. Cormack is granted a commission for duration of hostilities as Pilot Officer on probation (Oct. 7).

Administrative and Special Duties Branch.

The following are granted commissions in the ranks stated with effect from Sept. 1, 1939, and with seniority of the dates stated:—Squadron Leader.—Maj. G. J. B. E. Massy, M.C. (May 17); Flight Lieutenants.—Flt. Lt. E. Drudge, M.B.E. (R.A.F., Ret.) (Jan. 16, 1936); Flt. Lt. F. S. Wainscott (R.A.F., Ret.) (Jan. 27, 1936); Flt. Lt. F. J. Knowler (R.A.F., Ret.) (March 16, 1936); Cdr. R. V. De Haipert (R.N., Ret.) (Dec. 29, 1936); F/O. H. J. Wykes (Feb. 1, 1938); R. Hollingworth (July 1); Flt. Lt. W. Halford, D.F.C., F/O. J. V. Roberts (July 26); Capt. F. M. Rooth (Sp. U.L., I.A.) (Aug. 24); Maj. H. M. Tyler, Sqn. Ldr. D. McBirney (R.A.F., Ret.), Flt. Lt. G. L. Ormerod (R.A.F., Ret.), Lt.-Col. D. B. Gray, O.B.E., M.C. (I.A., Ret.), Maj. T. R. Wells (I.A., Ret.), Lt.-Col. E. W. Reynolds, Maj. the Hon. W. F. Somerset, Lt.-Col. W. E. D. Campbell (I.A., Ret.), Capt. L. H. Cooper, Maj. K. S. Grove, Maj. G. L. Shipton (Sp. U.L., I.A.), Capt. R. Wilson (Sp. U.L., I.A.), Maj. G. S Jarman (Sp. U.L., I.A.), Capt. D. M. Greene (I.A., Ret.), Lt. G. Barfoot-Saunt, F/O. E. J. Dilnutt (R.A.F.O.), Lt. C. F. Laxton, Maj. R. E. Lewis, Lt.-Col. J. P. Thompson, O.B.E. (I.A., Ret.) (Sept. 1).

The following are granted commissions as Flight Lieutenants on the dates stated:—Lt. W. Duce, F/O. J. H Parry (R.A.F.O.) (Sept. 4); Sir A. H. Seton (Sept. 13); Capt. W. E. Slingsby (Sept. 18).

P. C. Cabot is granted a commission for the duration of hostilities as Pilot Officer (Acting Flight Lieutenant) (Sept. 12). (Substituted for notification in *Gazette* of Sept. 26.)

The following are granted commissions for the duration of hostilities as Pilot Officers on probation on the dates stated:—A. D. Proudfoot, G. G. H. Welch (Sept. 5); O. St. J. Swan (Sept. 8); W Kennedy (Sept. 9); G. P. M. Davis (Sept. 11); C. J. Hart (Oct. 2); Capt. J. H. P. Brain (Oct. 4); W. H. F. Brunskill (Oct. 18); D. Ross (Oct. 23); P. H. Manners Wood, V. E. R. Blunt, G. J. Mapplebeck, E. C. Ormonde (Oct. 25); G. L. Chesney (Oct. 26); F. B. Scott (Oct. 29); L. Bertrand, B. W. Dalrymple, S. T. Hale, J. H. B. Hum, J. W Southwell-Lawlor, C. C. Wheeler (Oct. 30); W. V. Emanuel, R. G. Macey, A. L. Stewart (Oct. 31); B. Travers, W. E. Warden, M.C. (Nov. 1).

The following Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer on the dates stated:—J. S. Hicks (April 2); J. S. Hamilton (April 12); G. G. G. Graves (April 17); F. N. McDowell (May 4); C. W. Usher (Sept. 3); E. W. Cole (Hon. Flying Officer) (Sept. 6); R. T. Colley, K. F. Gardner (Hon. Flying Officer), C. G. Gilbert, A. Gillespie (Hon. Squadron Leader), G. Hamilton-Browne, J. B. Weir (Sept. 7); J. Blackwood, W. M. Page, C.B.E. (Hon. Air Commodore), J. A. Taylor (Hon. Group Capt.), H. R. Davies, M.C. (Hon. Squadron Leader) (Sept. 8); E. E. Colquhoun, M.B.E. (Sept. 13); L. T. Agger (Hon. Flight Lieutenant), A. K. Bradshaw (Hon. Flying Officer), W. H. R. A. Coates (Hon. Flight Lieutenant), J Delamere (Hon. Flying Officer), H. C. Eddowes (Hon. Flight Lieutenant), R. W. Fowler (Hon. Flight Lieutenant), F. D. Greeves (Hon. Flight Lieutenant), J. D. Haddon (Hon. Squadron Leader), W. Hilton (Hon. Flying Officer), C. J. Hunt (Hon. Flying Officer), C. N. Lewis (Hon. Flight Lieutenant), L. Milner (Hon. Flight Lieutenant), C. I. Morris (Hon. Squadron Leader), T. S. Preston (Hon. Flying Officer), A. C. Roberts (Hon. Flight Lieutenant), A. B. Titmarsh (Hon. Flying Officer), H. B. Walker (Hon. Squadron Leader) P. H. Wood (Hon. Flight Lieutenant) (Sept. 17); P. E. Thomas (Sept. 21); E. Y. Hughes (Oct. 4); R. S. V. Morris (Oct. 9); G. H. Keat (Oct. 22).

The date of appointment of the list of officers commencing with L. Abraham and ending with E. B. Williams in the *Gazette* of August 1 is July 25; F/O. S. M. B. Edwards, D.F.C., is promoted to the rank of Flight Lieutenant (Sept. 1); Pilot Officer on probation D. W. Pinkney, M.B.E, resigns his commission (Oct. 29); Pilot Officer on probation J. H. Tyler, M.B.E., relinquishes his commission on account of ill-health (Nov. 18); the notification in the *Gazette* of October 10 concerning R. I. Drake is cancelled.

Equipment Branch

E. V. T. Knight is granted a commission for the duration of hostilities as Acting Pilot Officer on probation (Oct. 19).

Accountant Branch.

The following are granted commissions as Flight Lieutenants (Sept. 1):—Maj. W. G. Tolson, Maj. A. L. Wilkes.

Medical Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—T. Crowley, M.B., B.Ch. (Aug. 23). B. Haring, M.R.C.S., L.R.C.P., D.P.H., C. H. Levick, M.R.C.S., L.R.C.P., C. F. H. Sergeant, M.R.C.S., L.R.C.P., M.B., Ch.B. (Oct. 25). G. F. Rees-Jones, M.R.C.S., L.R.C.P., D.M.R.E., R. F. Stubbs, M.B., Ch.B. (Nov. 1).

F/O. B. B. Merriman, M.R.C.S., L.R.C.P., relinquishes his commission on account of ill-health (Nov. 12).

Dental Branch.

The following are granted commissions for the duration of hostilities as Flying Officers on the dates stated:—H. F. Caudwell, L.D.S. (Oct. 19). E. Allen, L.D.S., W. K. Batten, L.D.S., M. C. Dutt, L.D.S., H. S. Gray, B.D.S., H. V. Jessop, L.D.S., C. E. Sharland, L.D.S., W. Wylde, L.D.S. (Oct. 31).

Meteorological Branch.

The following are granted commissions for the durations of hostilities as Flight Lieutenants:—F. E. Lumb, S. L. Portass (Nov 14).

Chaplains Branch.

The following are granted commissions for the duration of hostilities with the relative rank of Squadron Leader on the dates stated:—The Rev. S. W. L. Richards, O.B.E., M.A., D.C.L. (Oct. 10). The Rev. E. C. H. Tribbeck (Nov. 9).

Legal Branch.

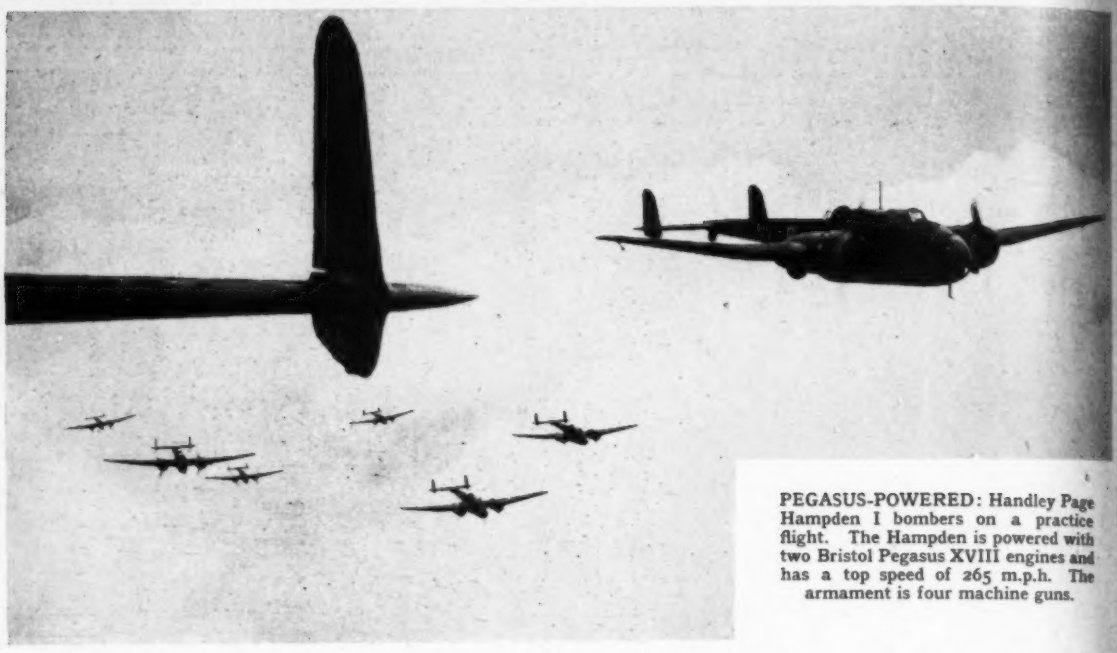
E. M. Trounson is granted a commission for the duration of hostilities as Flight Lieutenant (Nov. 7).

Errata.

In the *Gazette* of Sept. 26, for J. B. Lacey read J. B. Lacy; in the *Gazette* of Oct. 20, for Gotley Anthony Lefroy Henniker read Anthony Lefroy Henniker-Gotley; for Hugh D. H. Wardrop read Hew D. H. Wardrop.

MULTI-PURPOSE: A new picture of the Bristol Beaufort multi-purpose monoplane. It can function as a bomber, torpedo carrier, or strategical reconnaissance aircraft, and is powered with two of the new Bristol Taurus 14-cylinder sleeve-valve radials, which are notable for their small dimensions in relation to power.

Service Aviation



PEGASUS-POWERED: Handley Page Hampden I bombers on a practice flight. The Hampden is powered with two Bristol Pegasus XVIII engines and has a top speed of 265 m.p.h. The armament is four machine guns.

Auxiliary Air Force

General Duties Branch.

No. 608 (NORTH RIDING) SQUADRON.—P/O. H. P. G. Gray relinquishes his commission (Aug 17).

No. 906 (COUNTY OF MIDDLESEX) SQUADRON.— The following Acting Pilot Officers on probation are confirmed in their appointments, graded as Pilot Officers, and promoted to the rank of Flying Officer:—K. B. H. Edwards, T. E. Beddard (Sept. 28).

No. 907 (COUNTY OF MIDDLESEX) SQUADRON.—The following Pilot Officers are promoted to the rank of Flying Officer:—P. L. W. Morton, M. F. Darke (Oct. 9).

No. 909 (COUNTY OF ESSEX) SQUADRON.—P/O. H. W. Kerr, M.P., is promoted to the rank of Flying Officer (Oct. 20).

No. 911 (COUNTY OF WARWICK) SQUADRON.—Flt. Lt. N. W. R. Mawle, D.F.C., is promoted to the rank of Squadron Leader and appointed to the command of the Squadron (June 6).

No. 913 (COUNTY OF WARWICK) SQUADRON.—P/O. M. B. C. Lake is promoted to the rank of Flight Lieutenant (June 10); Flt. Lt. N. W. R. Mawle, D.F.C., is transferred to No. 911 (County of Warwick) Squadron (June 6).

No. 927 (COUNTY OF GLOUCESTER) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—H. V. Jervis, R. Broadbent, S. H. Clements, J. A. S. Williams, J. R. Bagnall-Oakley, C. J. King (Sept. 3).

No. 928 (COUNTY OF GLOUCESTER) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—A. F. B. Ham, K. G. Marsh, A. W. H. Tooke, H. G. Webster, C. D. Newman (Sept. 3).

No. 929 (COUNTY OF GLOUCESTER) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—W. J. W. Kettlewell, A. J. D. McArthur, A. L. R. Pearse, E. L. Bickle (Sept. 3).

No. 930 (HAMPSHIRE) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—H. I. Redfern, G. P. Ritchie, H. G. Bird (Sept. 3).

No. 931 (HAMPSHIRE) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—A. R. Lightfoot, S. W. Messenger, J. O. Fane, R. G. Booth (Sept. 3).

No. 932 (HAMPSHIRE) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—W. A. Foster, G. P. Brutton, J. A. Grafton, A. R. Avens, A. R. Bewes (Sept. 3).

No. 933 (HAMPSHIRE) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—J. P. Parker, J. F. Freeston, C. H. F. Palser, A. W. Dent, C. W. Kiln, N. F. W. Rockey, E. J. B. Langhorne (Sept. 3).

No. 934 (COUNTY OF DEVON) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—I. D. Spooner, J. P. Mills, H. Freeman, E. Garland, J. G. Kellock, L. P. Garbett, A. B. Ford (Sept. 3).

No. 935 (COUNTY OF GLAMORGAN) SQUADRON.—The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—A. G. Matthew, A. H. P. Noel (Sept. 3).

Equipment Branch.

No. 930 (HAMPSHIRE) SQUADRON.—E. F. Twiddy is granted a commission as Pilot Officer (Aug. 29).

Medical Branch.

No. 500 (COUNTY OF KENT) SQUADRON.—F/O. E. C. Gross, L.M.S.S.A., is promoted to the rank of Flight Lieutenant (Sept. 26).

No. 612 (COUNTY OF ABERDEEN) SQUADRON.—F/O. A. C. Hendry, M.C., M.B., Ch.B., is promoted to the rank of Flight Lieutenant (Sept. 23).

No. 615 (COUNTY OF SURREY) SQUADRON.—F/O. R. S. Cromie, M.D., B.Ch., B.A.O., is promoted to the rank of Flight Lieutenant (Sept. 23).

Women's Auxiliary Air Force

The following are appointed Company Assistants on the dates stated:—Miss H. M. Nutting, Miss J. M. Urquhart Mackay (Nov. 5); Miss P. Rollo (Nov. 12).

Company Assistant Miss M. Drury resigns her appointment (Nov. 4).

DAGGER-POWERED: The Hereford bomber as in production at the Short and Harland works. This machine may be considered as a Hampden fitted with Napier Dagger 24-cylinder H-shaped air-cooled engines. Several have already been completed.